U.S. DEPARTMENT OF COMMERCE · National Oceanic and Atmospheric Administration · National Weather Service

Instruction Manual

Isolation Distribution Equipment (IDE)

ENGINEERING DIVISION INSTRUCTION MANUAL NO. 6-118/6-119

INSTRUCTION BOOK

ISOLATION DISTRIBUTION EQUIPMENT

VOLUME 1

CONTRACT DOT FA78WA-4211

CONTRACTOR
ELECTRODYNAMICS, INC.
1200 HICKS ROAD
ROLLING MEADOWS, ILLINOIS 60008

MADE FOR
U.S. DEPARTMENT OF COMMERCE
NATIONAL WEATHER SERVICE

Instruction Manual

Isolation Distribution Equipment

Engineering Division
Silver Spring, Md.

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U. S. DEPARTMENT OF COMMERCE
Malcolm Baldrige, Secretary

National Oceanic and Atmospheric Administration
Anthony J. Calio, Deputy Administrator

National Weather Service
Richard E. Hallgren, Assistant Administrator

RECORD OF CHANGES

Specification No. FAA-D-2494/1a
FAA-D-2494/2a

CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL USE	CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL USE

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SAFETY NOTICE

The attention of operating and maintenance personnel is directed to FAA Instruction 6000.15 "Maintenance of Airway Facilities" for instructions on the subject of safety precautions to be observed, and to FAA Order 3900.19 "Occupational Safety." This equipment employs voltages which can cause severe burns. Caution shall be exercised when working with equipment.

KEEP AWAY FROM LIVE CIRCUITS

Operating and maintenance personnel must at all times observe all safety regulations. Do not change plug-in components with high voltage supply on. Under certain conditions, potentials may exist in circuits with power controls in the off position due to charges retained by capacitors.

RESUSCITATION

Maintenance personnel should familiarize themselves with the technique for resuscitation found in the manual of first aid instructions.

PRECAUTIONARY NOTICE, SEMICONDUCTOR DEVICES/INTEGRATED CIRCUITS

(a) Semiconductor devices are delicate. There are three principal abnormalities that are most harmful to semiconductors. These are (1) excessive voltage or current, (2) excessive temperature, and (3) excessive shock. Semiconductors are unusually susceptible to static discharge because of their low operating voltages and the construction of the semiconductor junction. The following are samples of various abnormalities encountered in practice, but it is important that personnel who work with semiconductors be proficient enough to realize the semiconductor's capabilities and limitations so that they can do maintenance with confidence.

(b) Static discharge can be avoided by eliminating all external connections to the circuit that can provide a ground path. Leads which have a high capacity to ground, such as ac power or antenna transmission lines and the elements of soldering irons, should not be touched to semiconductor circuits while the circuits are grounded. First, discharge the lines, and then connect them. The human body can also accumulate sufficient potential to discharge a damaging spark.

(c) Capacitors connected in the circuit should not be touched with external leads and should not be connected or disconnected while they still retain a charge. But both capacitors and semiconductors can be damaged by discharging the capacitor through a direct shunt. The capacitor should be allowed to discharge normally through the circuit RC time constant or be discharged through an external bleeder. Nothing in a semiconductor circuit should be connected or disconnected with power applied.

(d) Defective circuit components can provide excessive capacitive or resistive leakage currents that damage semiconductors either directly or because of bias changes that increase power consumption. For example, any coupling capacitor is capable of this if it should leak and provide abnormal forward bias to the following semiconductor.

(e) Always use some form of heat sink (usually pliers) between the semiconductor body and the soldering iron. The tendency is to use irons of too high a wattage rating (stay below 50 watts). The use of soldering guns should be avoided. The best soldering tool is one with replaceable tips of various wattages plus the unsoldering devices and vacuum tools for removal of excess solder. Do not unsolder a component known to be bad if it can be cut loose from the circuit. Then, only the leads need unsoldering, and this can be done quickly. If the leads are very short, cut the body of the component with side cutters.

(f) Cutting semiconductor leads with a side cutter causes an appreciable shock wave to be transmitted to the junction; this shock can cause rupture. The lead to be cut should be held with pliers between the body of the semiconductor and the place of cutting to absorb the shock. Similar damage

may be caused if the transistor is dropped. Striking a transistor case in search of intermittents is poor practice. Another cause of mechanical damage is overtightening of stud-mounted semiconductors. The mount should be mechanically secure, but the electrical efficiency of the joint is a matter of cleanliness in the joining surfaces. Never strike a circuit board against the bench to shake off solder.

(g) Ohmmeters used for continuity checks should never be used on the lowest ranges or on the highest ranges. Only general warnings can be given to this instruction book; no ohmmeter should ever be used with semiconductors until its instruction book has been studied. An ohmmeter has doubtful value as a service tool for semiconductors out of the circuit. Use a transistor tester with at least the capability to test gain and capacitive leakage.

(h) Applying operating voltage of incorrect polarity can ruin semiconductors. A simple way to ensure proper polarity is to take a spare diode and connect it to the circuit so that it will block the supply if it is connected in reverse. This diode can be tack-soldered to the circuit board input or to the incoming lead from the power supply. The diode should, of course, be capable of handling the voltage and current requirements of the circuit plus the surges of the supply.

WARRANTY

(a) Notwithstanding inspection and acceptance by the Government of supplies furnished under this contract or any provisions of this contract concerning the conclusiveness of said inspection and acceptance, the Contractor warrants each item delivered under the contract against defects in design, material or workmanship, and against any damage caused prior to delivery to the Government. Unless otherwise specified, this warranty extends for a period of one year from the date of first use by the Government or two years from date of delivery, whichever occurs first.

(b) Upon notice in writing, the Contractor shall, within 30 days after receipt of such notice, repair or replace all defective or damaged items delivered under the contract, f.o.b. any point or points designated by the Government with the 48 contiguous states and the District of Columbia, at no cost to the Government. In the event the contractor is unable to effect such repair or replacement within the aforesaid 30 days, he shall, within 50 days after receipt of notice, submit in writing a schedule of repair or replacement to the Contracting Officer. The Contractor may elect to have any replaced item returned to his plant at his expense.

(c) Unless they fail as a result of improper application by the Contractor, electron tubes, batteries, natural rubber, and material normally consumed in operation are excluded from this warranty, but shall in any event be warranted by the Contractor to the extent of any warranty received by the Contractor from his supplier.

(d) If twenty percent (20%) or more of the total quantity of any part of a component to which this warranty applies (but not fewer than two of any such part or component) fails in normal service, that fact shall be conclusive evidence that the desgin, material, or workmanship of the item delivered under the contract is unsuitable for the purpose intended. Upon notice of this failure rate, the Contractor shall: (i) replace all quantities of the part of component with a corrected part or component in a manner satisfactory to the Government, and at no cost to the Government, and (ii) if necessary to ensure correction of the deficiency, redesign the item delivered under the contract, or any portion thereof, in a manner satisfactory to the Government and at no cost to the Government. The provisions of this paragraph (d), however, shall not apply to any part or component to be furnished which is specifically identified in the contract by brand name; provided, however, that the Contractor shall warrant such part or component to the extent of any warranty received by the Contractor from his supplier.

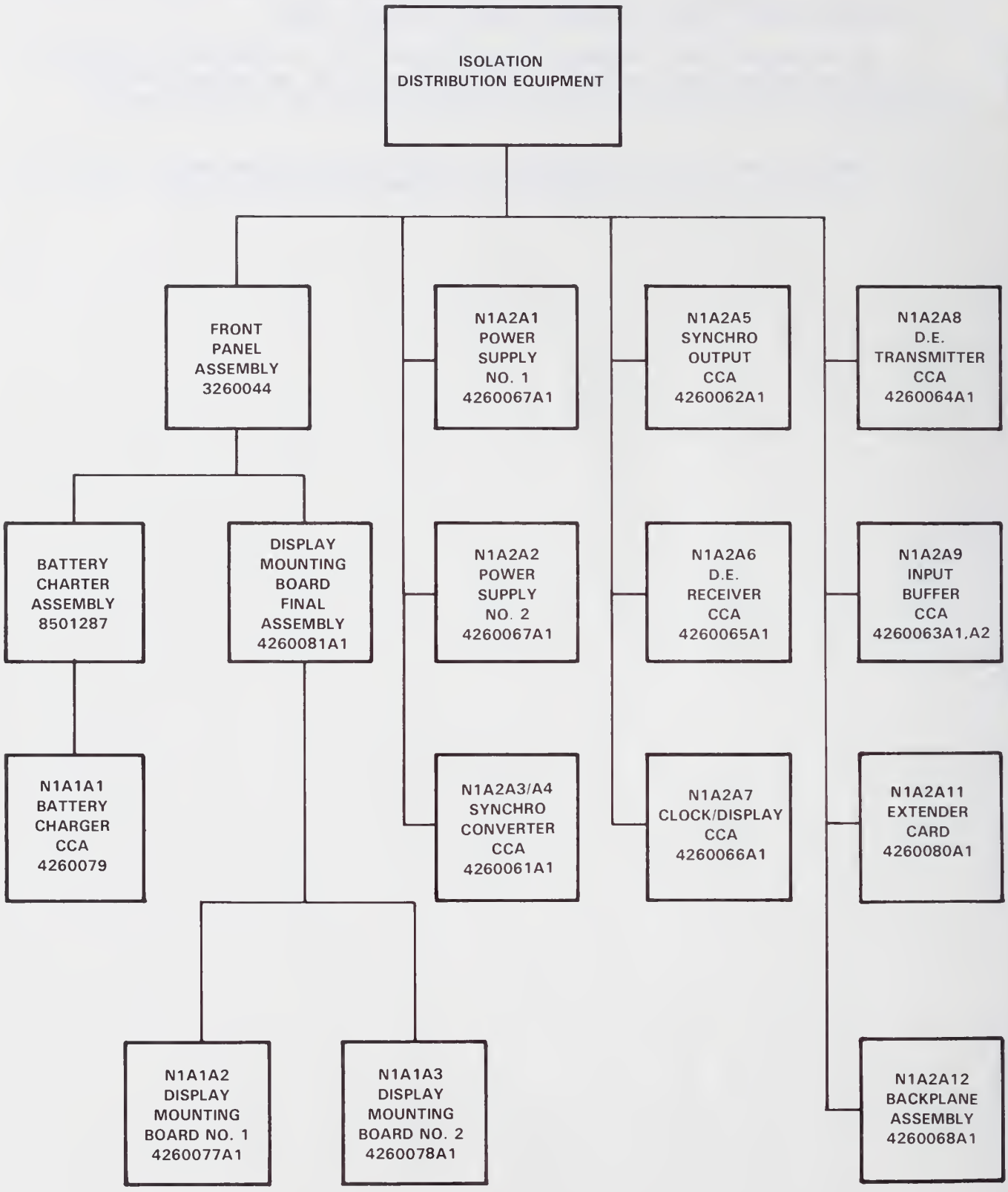
(e) For a period of one year from the date of its first use by the Government or two years from the date of its replacement or redesign, whichever occurs first, each item (or portion thereof) or part or component, which is replaced or redesigned pursuant to paragraph (d) above, shall itself be warranted in accordance with the terms of paragraph (d).

(f) The warranty periods specified herein shall exclude any period of time an item fails to perform satisfactorily due to defects or damage to which this warranty applies.

(g) For the purpose of this "Warranty" clause, the term "item" is defined as the contract line item. In the event any item part, or subpart, or component thereof fails, the Contractor shall be responsible for all actions necessary to correct such failure and return the contract line item to operating order.

(h) Failure to agree upon any determination to be made under this clause shall be a dispute concerning a question of fact within the meaning of the "Disputes" Clause of this contract.

FAMILY TREE CHART



FUNCTIONAL INDEX

1.1 INTRODUCTION. — The purpose of this information book is to provide all data needed to properly operate, maintain, and repair the Isolation Distribution Equipment (see figure 1-1) (hereinafter referred to as IDE). The IDE is part of the Radar Remote Weather Display System (RRWDS). For complete coverage, this instruction book must be used in conjunction with the RRWDS instruction books.

1.2 EQUIPMENT DESCRIPTION.

1.2.1 Purpose. — The purpose of the IDE is described below:

1.2.1.1 The Isolation Distribution Equipment (IDE) interfaces with National Weather Service (NWS) WSR-57, WSR-74C, and WSR-74S radars, the FAA Radar Remote Weather Display System (RRWDS), and non-governmental display remoting equipment.

1.2.1.2 The IDE accepts 8-bit parallel, filtered radar data and status information from the government furnished Digital Video Integrator and Processor (DVIP) and converts it into a composite serial format for distribution to multiple users, providing complete isolation between the radar and the equipment. The IDE also provides optical isolation and synchro-to-digital conversion of antenna position and azimuth information from the WSR-57 radar.

1.2.1.3 The IDE provides optical isolation between the radar and multiple user equipment. The output from the IDE will drive a 75-ohm line, requiring the user equipment to be interfaced with an opto coupler. Opto coupling provides sufficient isolation to prevent loading by the IDE or any external equipment, thus eliminating the possibility of ground loops between equipment.

1.2.2 RRWDS Modifications. — Since the RRWDS must interface with both FAA and NWS radars, the RRWDS Type IV Weather Digitizer (FA-9901/4) and Type V Weather Digitizer (FA-9901/5) equipment must be modified to accept the serial data provided by the IDE. This modification involves removing the parallel interface, the azimuth and elevation synchro modes, the digital video integrator and processor, and the digital clock. To accommodate the serial interface, a serial receiver and a communication processor card must be added to the RRWDS. Operation and maintenance instructions for the RRWDS Types IV and V Weather Digitizers are given in TI 6340.15.

1.2.3 Equipment Description. — The physical arrangement of the IDE is shown in figures 1-2 through 1-4. The major physical assemblies are described in paragraphs 1.2.3.1 through 1.2.3.3

1.2.3.1 Enclosure.

1.2.3.1.1 The aluminum enclosure for the IDE is designed for wall mounting. Hardware is provided to allow the on-site mounting of the equipment on a masonary surface. Installation details are covered in Section 9.

1.2.3.1.2 Except for front panel and connector panel components, all electrical parts are mounted on plug-in printed circuit card assemblies (CCAs) which are accessible from the front of the enclosure by swinging open the front panel assembly. The front panel assembly is swung open by releasing five 1/4-turn, quick-release fasterers. All connections to the IDE are made via the connector panel on the bottom of the enclosure.

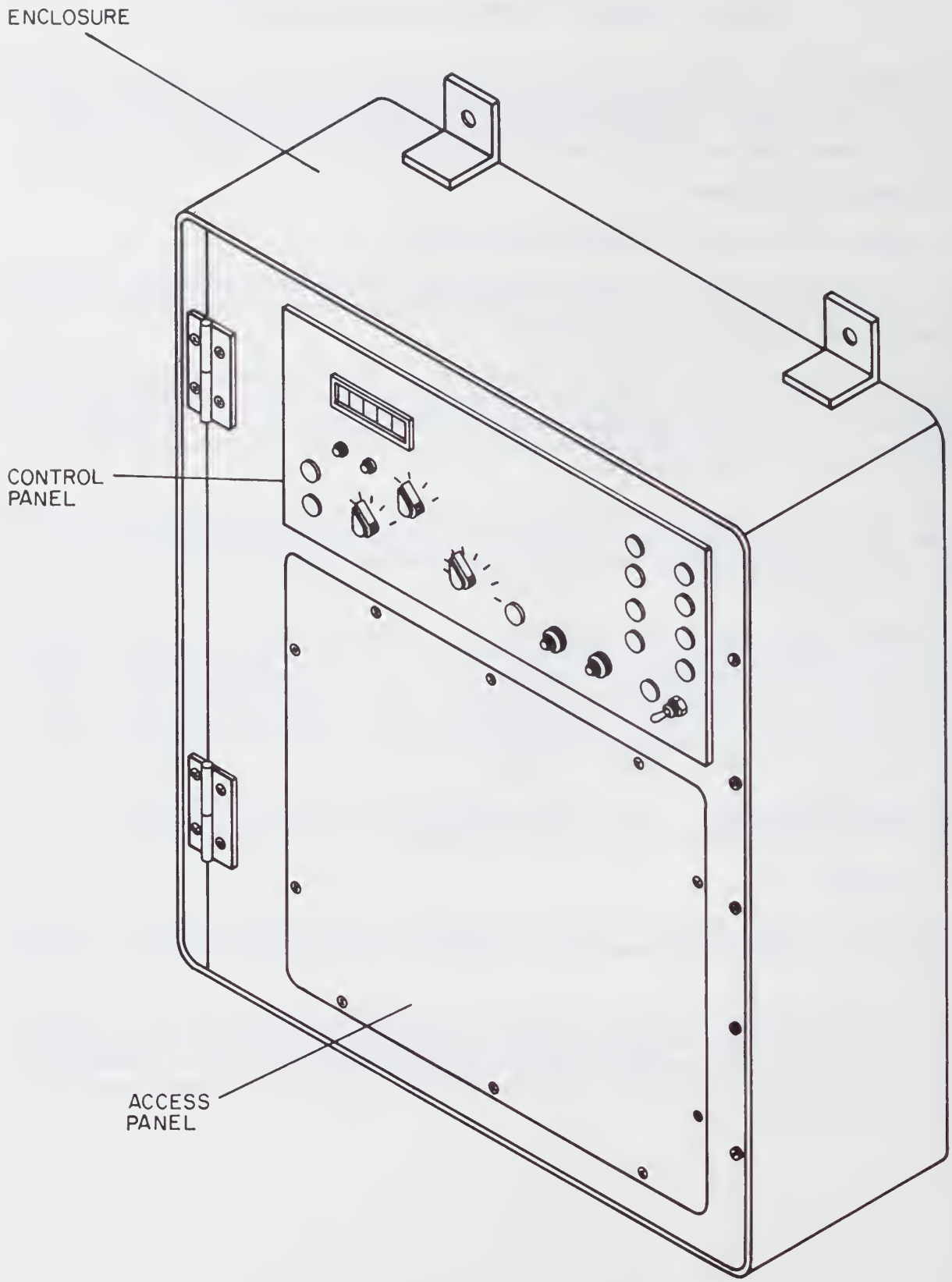


Figure 1-1. Isolation Distribution Equipment

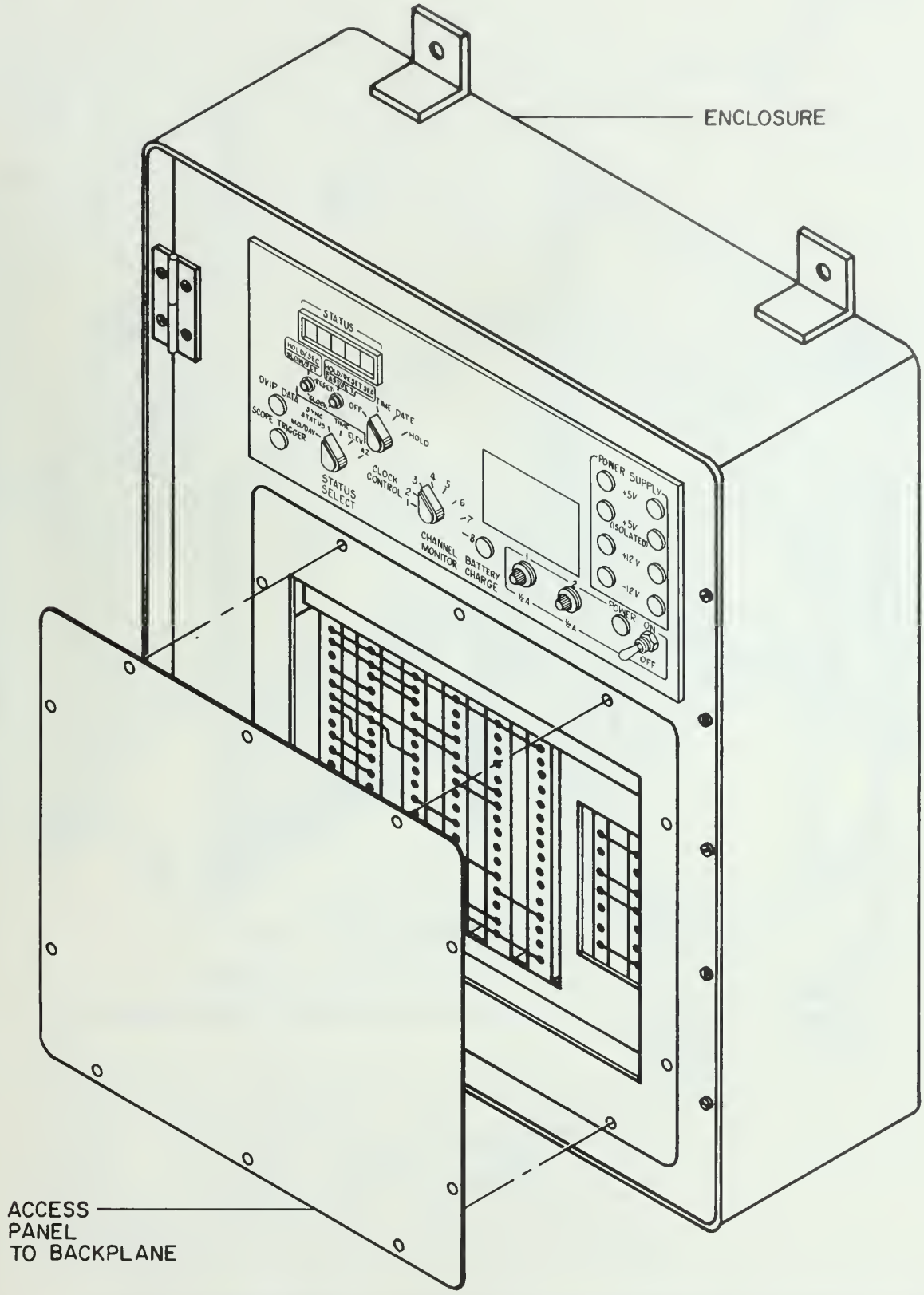


Figure 1-2. Isolation Distribution Equipment — Front Access Panel Removed

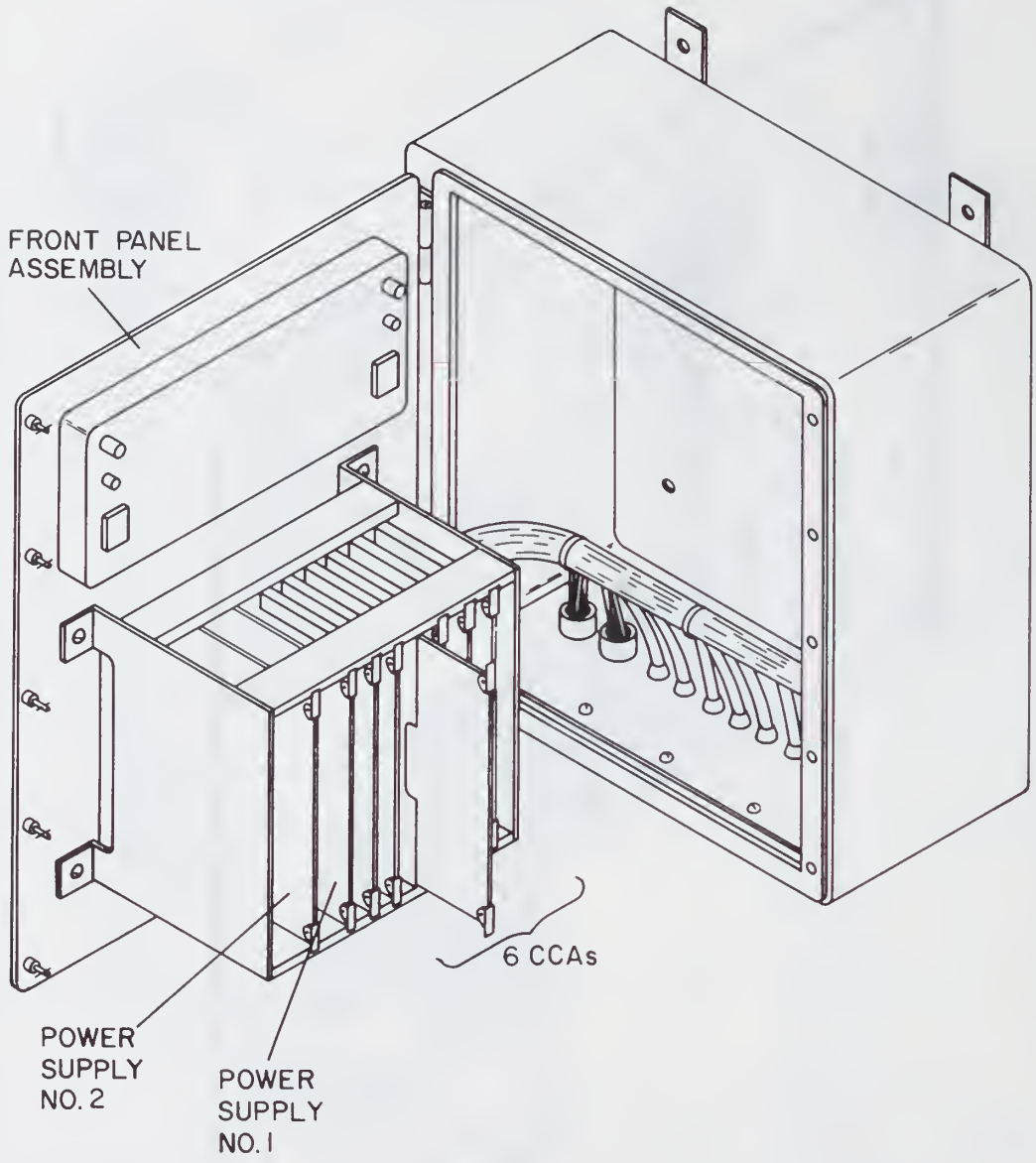


Figure 1-3. Isolation Distribution Equipment — Normal Maintenance Position

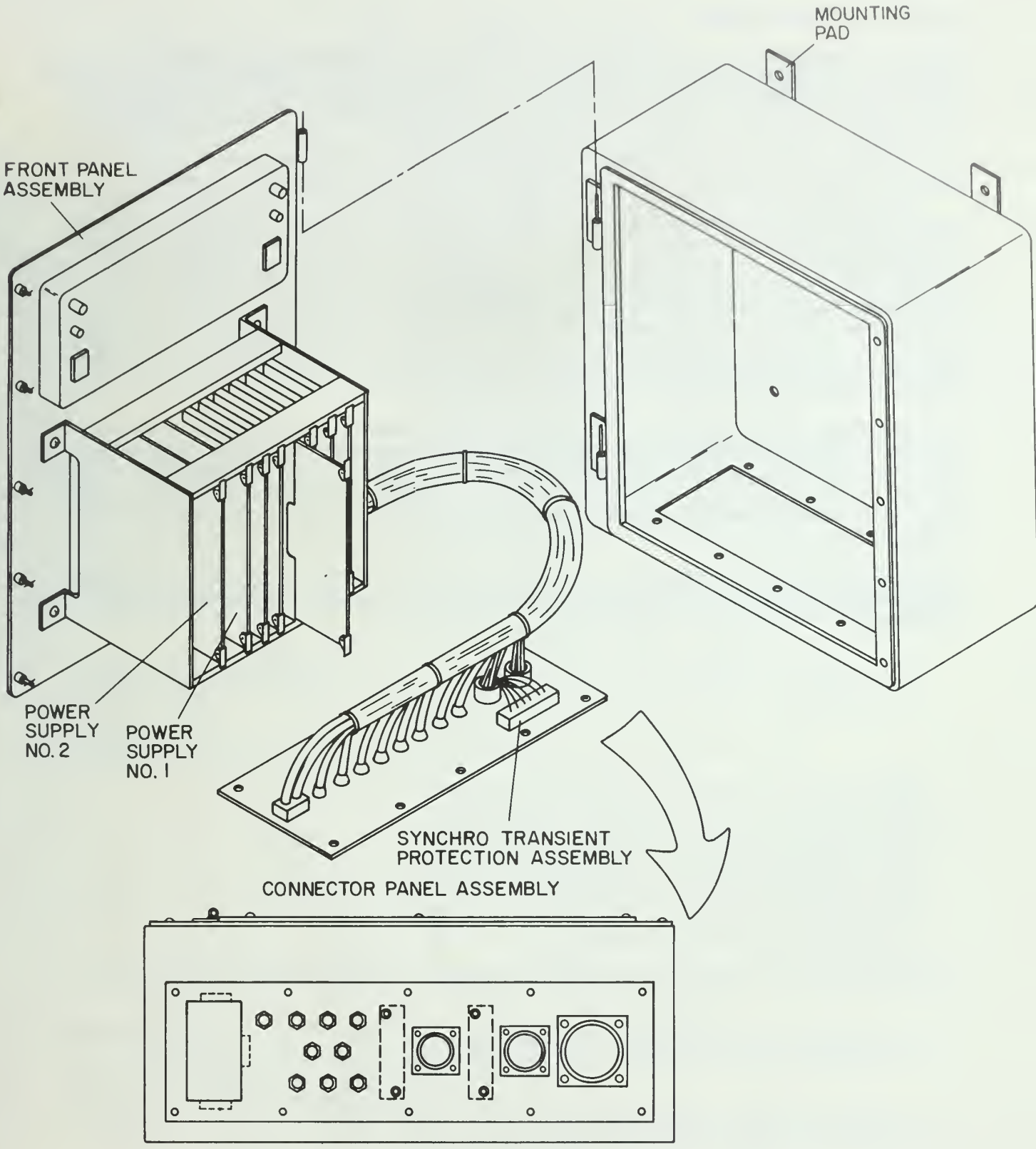


Figure 1-4. Isolation Distribution Equipment — Normal Maintenance Position with Connector Panel Removed

1.2.3.2 **Front Panel Assembly.**

1.2.3.2.1 The swing out front panel assembly consists of a display, all controls and indicators, a removable access panel, and a circuit card rack. The upper part of the front panel assembly is devoted to the display and control functions. This section is recessed approximately 1 inch to prevent any accidental control operation. The controls and displays are grouped according to functional operation.

1.2.3.2.2 The front panel assembly has an access panel which can be removed to gain access to the backplane assembly connections. This panel will not be removed for normal type maintenance.

1.2.3.2.3 A card rack, mounted on the back face of the front panel assembly, houses the IDE circuit cards. Circuit cards are separated by function and contain both test points and adjustments that are accessible without the use of card extenders with the CCAs mounted in the card rack. Test points are provided for the measurement and observation of voltages and waveforms required for servicing, testing, and maintenance of individual units. Each CCA is individually keyed to its mating connector and also has an internal card ejector which provides a convenient means of removal of the mating halves of the connection and for grasping for removal from the rack. The printed circuit card extenders supplied with each unit are located in a spare block CCA receptacle position. The redundant power supplies are also packaged as plug-in circuit card assemblies.

1.2.3.3 Connector Panel Assembly. — The connector panel assembly mounts to the bottom of the enclosure. Since this panel is a separate assembly, the entire, completely wired system can be removed from the enclosure by removing the fasteners on the connector panel and lifting the front panel assembly from its hinges. A synchro transient protection assembly is mounted on the connector panel assembly as shown in figure 1-4. The AC line also has an EMI filter included in the entry power connector.

1.3 EQUIPMENT SPECIFICATION DATA. — Table 1-1 provides equipment specification data including functional characteristics, output characteristics, electrical power requirements, and environmental characteristics.

Table 1-1. Equipment Specifications

	FUNCTIONAL CHARACTERISTICS
Radar Inputs:	All digital inputs (from the radar) have open collector outputs. Signals common to both radars are as follows:
Computer Data Bus C7-C0 (WSR-57) VOL 8 — VOL 1 (WSR-74 only) Data ="high" true.	The computer data bus is the 8-bit parallel filtered data output with no STC correction. All 8 lines are open collector outputs (i.e., receiving device provides pullup resistor). The data is "low" true (i.e., Low = On; High = Off). Each output has its own return to ground which should be twisted with the original signal. Data is updated at 6.7 usec intervals.
Data Ready	This signal is a "low" true, open collector data strobe for the computer data bus. Clocking on the negative going transition is preferable.
Test Level	This open collector output indicates the state of the DVIP unit (High = NORM: Low = TEST).
Range Coverage	This open collector output indicates the number of kilometers being sent from the DVIP (High = 450 Km; Low = 230 Km).
Selected Time Sample	This DVIP open collector output indicates the azimuth resolving time sample of 15 or 31. WSR-57: (High = 31; Low = 15) WSR-74: (High = 15; Low = 31).
Attenuate Bypass (IFATBPM) (WSR-74 only)	This open collector output indicates the state of the IF attenuator (High = Attn in use; Low = Normal).
Digital Synchro Data (WSR-57)	Five-wire synchro data is described below: Accepts standard 5-wire (three stators, two rotors) 90V synchro information from the WSR-57 azimuth (31TX6) and elevation (23TR6) axes. These lines are isolated and transient protected. Synchro to digital converters for both azimuth and elevation are included. The elevation data from the WRS-57 is 2.5 times the true elevation. The elevation data is electronically multiplied by 0.4 (divided by 2.5) to yield true elevation data before distribution.
AZ and EL BCD (0.1 through 200.0)	These open collector outputs indicate the antenna azimuth or elevation angles in BCD degrees.
System Trigger	Positive-going pulse of between 0 and 40 volts, 0.5 to 2.5 microseconds in width; leading edge starts zero range.
Isolation	The IDE is electrically isolated from all other equipment by the use of isolation transformers or optical isolators on all inputs and outputs.

Table 1-1. Equipment Specifications (Continued)

	FUNCTIONAL CHARACTERISTICS
Inputs	All digital inputs are optically isolated including power supply isolated from the remainder of the distribution equipment. The synchro INHIBIT signals from the IDE to the radar are treated similarly. The WSR-57 synchro lines use transformer for isolation. The distribution equipment does not affect operation of the radar.
Outputs	All users are equipped to optically isolate with floating power supply when attaching to any of the eight serial outputs. All outputs are short circuit protected. Shorting any output does not affect the performance of any other output. Each output is capable of driving its signal into a characteristic 75 ohms impedance at the end of up to 200 feet of type RG59U or equivalent coaxial cable.
Different Radars	The IDE accepts data from two basic radar systems: the WSR-57 and the WSR-74.
	IDE OUTPUT CHARACTERISTICS
IDE Serial Output Data Format: General Format	Output format is bit-serial, in an asynchronous format, with one start and one stop bit per 8-bit byte, plus an odd parity bit (11-bits total). The least significant bit within each field is transmitted first. The serial bit rate is 1.789772 MHz, (one-half the NTSC standard T.V. subscriber frequency 3.579545 MHz $\pm$10 Hz).
DVIP Data	8-bit (byte) per data point; 1 to 230 or 1 to 450 Km, in 1 Km increments, binary format. One full radial of data transmitted for each trigger pulse of the radar.
Data Block	Starting auxiliary data sync byte = HEX FF
AZ (or EL) INHIBIT	This "low true" signal from the distribution equipment to the radar freezes the output buffer of the converter allowing collection of data (High = Conversion in process; Low = Data "frozen").
Antenna Position Data: Azimuth Position	BCD format: 000.0 to 359.9 DEG., 01. DEG. resolution, contained in two bytes.
Elevation Position	Elevation position: BCD format, 000.0 to 359.9 DEG., 0.1 DEG. resolution, contained in two bytes. Data between 000.0 and 065.0 are positive upward angles and data from 359.9 to 350.0 are negative downward angles when substracted from 360.0.

Table 1-1. Equipment Specifications (Continued)

	IDE OUTPUT CHARACTERISTICS
DVIP Status:	
Operating mode: normal or test.	Bit-0: "1" = Normal "0" = Test
Azimuth response: effective sample size 15 or 31	Bit-1: "1" = 31 "0" = 15
Range coverage: 0-230 or 0-450 Km	Bit-2: "1" = 450 "0" = 230
Manual IF attenuation (WSR-74 only); in use? Yes or No	Bit-3: "1" = IN "0" = Out
	(Note: Bit numbering assumes "0" = LSB, first transmitted; bit 4-7 not used = "0").
	ELECTRICAL POWER REQUIREMENTS
Voltage	105 — 125 Vac
Amperage	0.25A
Frequency	60 ±2 Hz
Phase	Single Phase
Power Consumption	55W, Continuous, Fully Populated; 80W Surge
	ENVIRONMENTAL CHARACTERISTICS
Ambient Temperature Range	+10°C to +50°C
Relative Humidity Range	10% to 80%
Altitude Range	0 to 10,000 feet above sea level.

1.4 EQUIPMENT AND ACCESSORIES SUPPLIED. Equipment and accessories supplied with the IDE are listed in Table 1-2. This includes an inventory of the Spare Parts Kit and the Installation Kit.

Table 1-2. IDE Equipment and Accessories Supplied

QYT	NOMENCLATURE	PART NUMBER	FSCM
	SPARE PARTS KIT SPK-R541 (WSR-74)		
1	Serial Receiver CCA	4260065A1	10236
1	DE Transmitter CCA	4260064A1	10236
1	Input Buffer CCA	4260063A2	10236
1	Clock Display CCA	4260066A1	10236
1	Battery Charger CCA	4260079A1	10236
1	Power Supply CCA	4260067A1	10236
1	Extender Card	4260080A1	10236
1	Display Mounting Assembly	4260081A1	10236
2	Lamp	7230016-1	10236
2	Lamp	7230016-4	10236
2	Lamp	7230017-1	10236
2	Display, 7 Segment	7230023-1	10236
2	LED	7030057-1	10236
10	Fuse, 1/2A SLO	7260011-15	10236
1	Switch	7152050-1	10236
1	Switch	7152051-2	10236
1	Switch	7152052-1	10236
1	Switch	7152051-1	10236
1	Switch	MS90311-211	96906
	INSTALLATION KIT 1130065A2 (WSR-74)		
1	Interconnect Cable (System Trigger)	2260020A1	10236
1	Interconnect Cable (Data)	2260019A1	10236
1	Connector, Straight Plug	MS3116J-22-55P	96906
1	Connector, BNC	UG-260C/U	81349
1	Cord, Power, 3 Wire	8030046	10236
8	Terminator, 75 Ohm	7010048	10236
4	Bolt, Lag	MS16992-199	96906
4	Anchor, Screw	8141114-1	10236
4	Anchor, Screw	8141114-2	10236

Table 1-2. IDE Equipment and Accessories Supplied (Continued)

QYT	NOMENCLATURE	PART NUMBER	FSCM
4	Washer, Flat	MS15795-810	96906
4	Washer, Flat	MS15795-814	96906
4	Shield, Exp.	FF-S-323	81349
AR	Solder	SN60	81349
	SPARE PARTS KIT SPK-540 (SWR-57)		
1	DE Receiver CCA	4260065A1	10236
1	DE Transmitter CCA	4260064A1	10236
1	Input Buffer CCA	4260063A1	10236
1	Clock Display CCA	4260066A1	10236
1	Battery Charger CCA	4260079A1	10236
1	Synchro Converter CCA	4260061A1	10236
1	Synchro Output CCA	4260062A1	10236
1	Power Supply CCA	4260067A1	10236
1	Extender Card	4260080A1	10236
1	Display Mounting Assembly	4260081A1	10236
2	Lamp	7230016-1	10236
2	Lamp	7230016-4	10236
2	Lamp	7230017-1	10236
2	Display, 7 Segment	7230023-1	10236
2	LED	7030057-1	10236
10	Fuse, 1/2A SLO	7260011-15	10236
1	Switch	MS90311-221	96906
1	Switch	7152050-1	10236
1	Switch	7152051-2	10236
1	Switch	7152052-1	10236
1	Switch	7152051-1	10236
	INSTALLATION KIT 1130065A1 (WSR-57)		
1	Interconnect Cable (Data)	2260017A1	10236
1	Interconnect Cable (Synchro)	2260018A1	10236

Table 1-2. IDE Equipment and Accessories Supplied

QYT	NOMENCLATURE	PART NUMBER	FSCM
1	Connector, Straight Plug	MS3106A-32-414S	96906
12	Terminal, Ring Lug	8240053-1	10236
1	Clamp, Cable	AN3057-20	88044
1	Cord, Power, 3 Wire	8030046	10236
1	Bushing	MS3420-8	96906
1	Bushing	MS3420-10	96906
1	Bushing	MS3420-12	96906
1	Bushing	MS3420-16	96906
1	Bushing	MS3420-20	96906
30''	Insulated Sleeving	Class I, Clr.	81349
8	Terminator, 75 Ohm	7010048	10236
4	Bolt, Lag	MS16992-199	96906
4	Screw, Anchor	814114-1	10236
4	Screw, Anchor	814114-2	10236
4	Washer, Flat	MS15795-810	96906
4	Washer, Flat	MS15795-814	96906
4	Shield, Exp.	FF-S-325	81349
AR	Solder	SN60	81349

1.5 EQUIPMENT REQUIRED BUT NOT SUPPLIED. Equipment required but not supplied is listed in Table 1-3.

Table 1-3. Equipment Required but not Supplied

NOMENCLATURE	PART NUMBER	NATIONAL STOCK NUMBER	FSCM
Pliers		5110-00-240-6209	81348
Pliers		5120-00-293-3481	81348
Stripper, Wire		5110-00-268-4224	81348
Screwdriver, Flat Tip		5120-00-278-8502	81348
Screwdriver, Flat Tip		5120-00-278-1267	81348
Screwdriver, Phillips		5120-00-240-8716	81348
Screwdriver, Phillips		5120-00-227-7293	81348
Crimper	1963		79061
Handle, Soldering	750		78976
Heater, Soldering	1237-S		78976
Tip, Soldering	PL-151		78976
Tip, Soldering	PL-155		78976
Alignment Tool	35F818		72653
Wrench, Adjustable	7760		79061

SECTION 2. TECHNICAL DESCRIPTION

2.1 INTRODUCTION. This section contains the technical details for the Isolation Distribution Equipment (IDE). Presentation of the data is intended to provide adequate technical detail to (1) support a qualified maintenance technician in his maintenance task, (2) support formal training courses for the IDE, (3) support on-the-job training, and (4) provide adequate technical data for a technician self-train program.

2.2 DATA FORMAT. The IDE accepts 8-bit parallel, filtered radar data and status information from the Government furnished Digital Video Integrator and Processor (DVIP) and converts it into a bit-serial asynchronous format with one start, one stop, and one parity bit per 8-bit byte. For each radial of data, an auxiliary block of information containing the DVIP status, azimuth position, antenna position, time of day, and date will be transmitted as shown in figure 2-1.

2.3 BLOCK DIAGRAM FUNCTIONING.

2.3.1 IDE Functioning. (See figures 2-2 and 10-19)

2.3.1.1 The IDE consists of an input buffer circuit card assembly (CCA), serial transmitter and serial receiver CCAs, a clock/display CCA, synchro converter and synchro output CCAs, two power supply CCAs, a battery charger assembly, and miscellaneous components on the front panel and connector panel.

2.1.3.2 Isolation between the radar and multiple user equipment is provided by optocouplers on the input buffer CCA. Every signal coming from the radar to the IDE is optically isolated for the WSR-74. The inputs from the WSR-57 are also optically isolated on the input buffer CCA except for antenna position. The antenna position inputs are three-wire synchro signals for antenna azimuth and elevations. These synchro signals are transformer isolated and converted into digital form on the synchro converter CCA. The input buffer CCAs also provide optically isolated elevation and azimuth inhibit signals required by the WSR-74 radar.

2.3.1.3 The function of the asynchronous transmitted CCA is to serialize the 10, 8-bit wide, parallel data bits provided to its input via the data bus. The parallel inputs to the transmitter CCA include data and status information from the DVIP (both radars) and WSR-57 azimuth and elevation information provided via the synchro output CCA. Data transfer via the data bus is controlled by the transmitter CCA. The baud rate of the serial output is approximately 1.8 MHz.

2.3.1.4 The receiver CCA monitors the serial bit stream from any selected output line and provides parallel information to the front panel for readout of status information, and to a digital-to-analog (D/A) converter on the display/clock CCA for analog presentation of DVIP data on an oscilloscope.

2.3.1.5 The display/clock CCA provides two separate functions: provides time and data information to the serial transmitter CCA and latches data from the receiver CCA for display on the front panel. The clock/calendar function requires the use of a battery back-up system. A battery charger assembly located on the front panel assembly keeps the battery charged.

2.3.1.6 Redundant power supplies provide the dc voltages required for operation of the IDE. Each power supply is complete on a single CCA and supplies all four voltages required for system operation. These are +5 Vdc, +12 Vdc, and −12 Vdc and an isolated 5 Vdc for radar interface circuits.

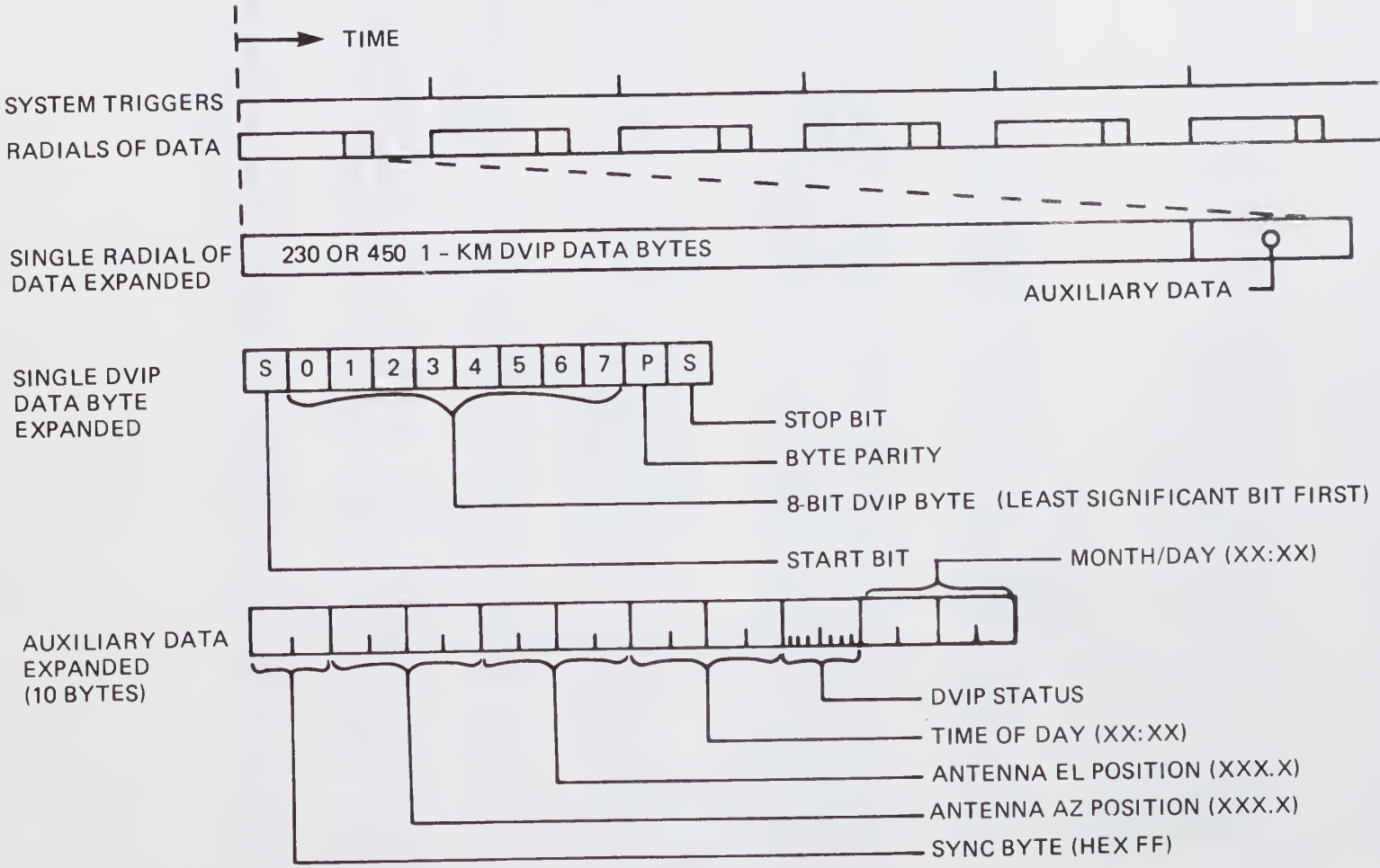


Figure 2-1. Serial Radar Data Format

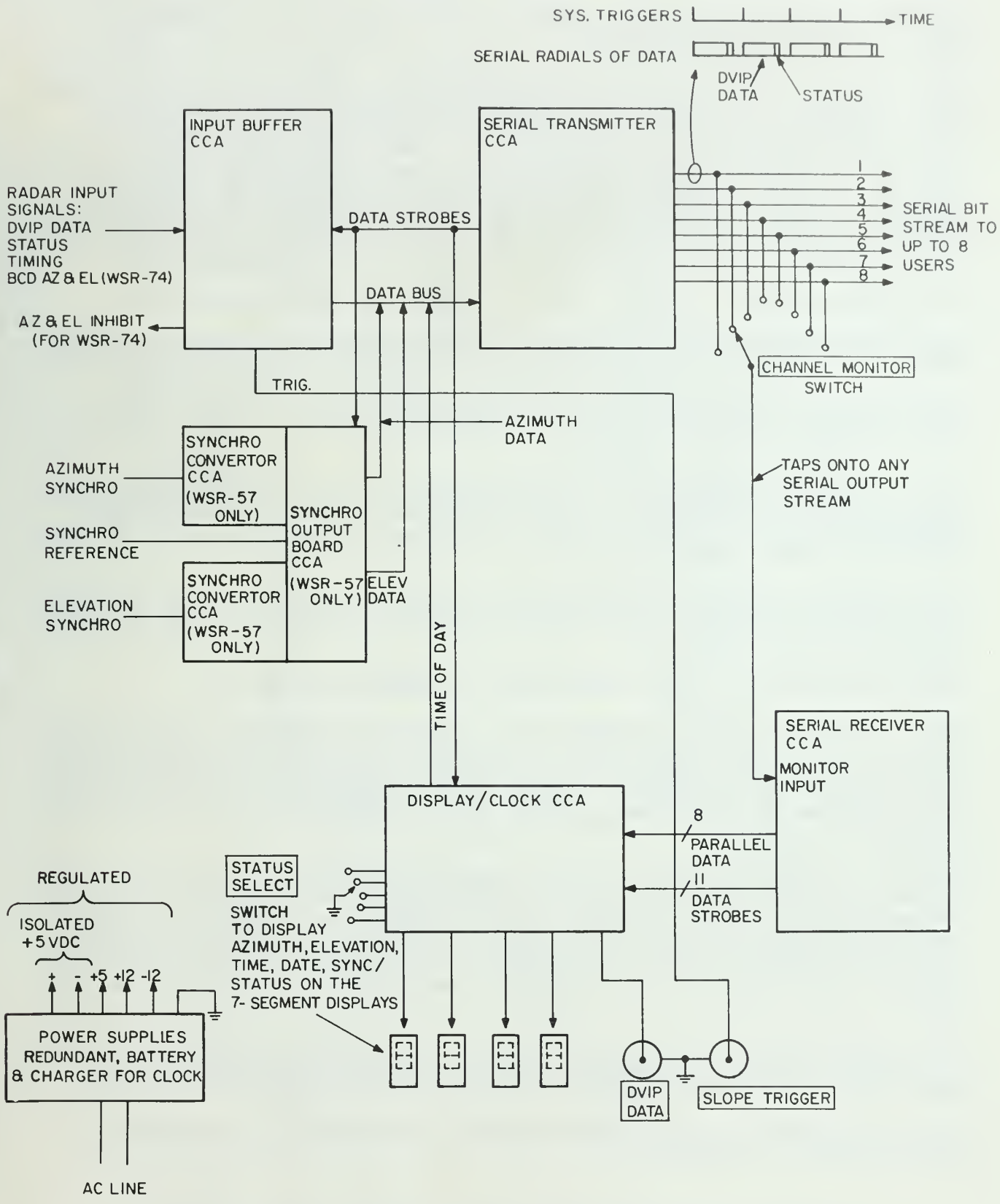


Figure 2-2. Isolation Distribution Equipment/Block Diagram

2.3.2 Battery Charger CCA N1A1A1 Functioning. (See figure 10-20)

2.3.2.1 The IDE clock/calendar function requires the use of a battery back-up system which is discussed in the clock/display CCA section.

2.3.2.2 The battery charger assembly, located on the front panel, operates from the ac line through a separate transformer. The charger circuit is a constant voltage regulator with current limit which prevents charging the battery at a damaging current level. The charger output is set at the level recommended to prevent over-charging the battery. For a 12-volt battery, this is 14.4 volts. Since the battery is diode OR'd to the IDE clock circuit, the +12-volt bus cannot overcome the back-bias of its series diode. Therefore, the charger will normally supply both battery charging current and clock IC operating current. When power fails, the charger and +12-volt bus fall to zero, and the battery takes the clock chip load because the OR diodes leave only the battery connected to the clock chip. The battery charging circuits have a status indicator which lights when the charging is operational.

2.3.3 Display Mounting No. 1 and No. 2 CCAs N1A1A3/A2. (See figures 10-21 and 10-22)

2.3.3.1 Display mounting boards No. 1 and No. 2 are two small PC boards assembled on stand-offs. Together they form a plug-in module to the front panel and are used for displaying status information.

2.3.3.2 Display mounting board No. 1 contains the four BCD-to-7 segment decoders used to drive the 7-segment displays. These are U1 through U4. The outputs of these drivers are active low logic, and they are current-limited by 240 ohm resistors.

2.3.3.3 In addition to the 7-segment information, the display unit also provides display features for a dash used to separate day and month, a colon used to separate hours and minutes and a decimal point for azimuth and antenna elevation display. The signals used to control these displays come from the front panel display selection rotary switch.

2.3.3.4 Display mounting board No. 2 contains the 7-segment displays DS1, DS2, DS4, and DS5 and the discrete LED array DS3. The 7-segment displays are common anode displays to interface with the active low logic of the decoder.

2.3.4 Power Supply No. 1 and No. 2 CCA N1A2A1/A2 Functioning. (See figure 2-3)

2.3.4.1 The IDE power supply is a redundant system employing dual independent off-line switching converters. Figure 2-3 is the power supply CCA block diagram which is identical for each supply. Each power supply is complete on a single circuit card assembly and supplies all four voltages required for system operation. These are +5 Vdc, +12 Vdc, −12 Vdc and an isolated 5 Vdc for radar interface circuits. In addition, all output voltages are isolated from the ac line by transformers of greater than 5 megohm isolation resistance.

2.3.4.2 A full-wave bridge rectifies the ac line to supply power through a L-C filter. This dc voltage is switched at a 100 KHz rate in the primary winding of the respective output transformer. Regulation is achieved by pulse width modulation (PWM) with a complex integrated circuit as the control element. This IC has all the control needed for voltage regulation and current limiting. The current limiting is a separate input to the IC from the 1:1 ratio transformer used as current sampling in the primary of the respective output transformer. The current limit is a foldback mode which triggers the ICs slow start circuit.

2.3.4.3 The switching function has been implemented with high voltage, high efficiency power MOS FET transistors. This permits high frequency operation and, therefore, small component size. The resulting efficiency permits full power operation with only convection cooling.

2.3.4.4 A small ac line transformer supplies a separate dc voltage to each of two PWM ICs. This insures line isolation of the control ICs.

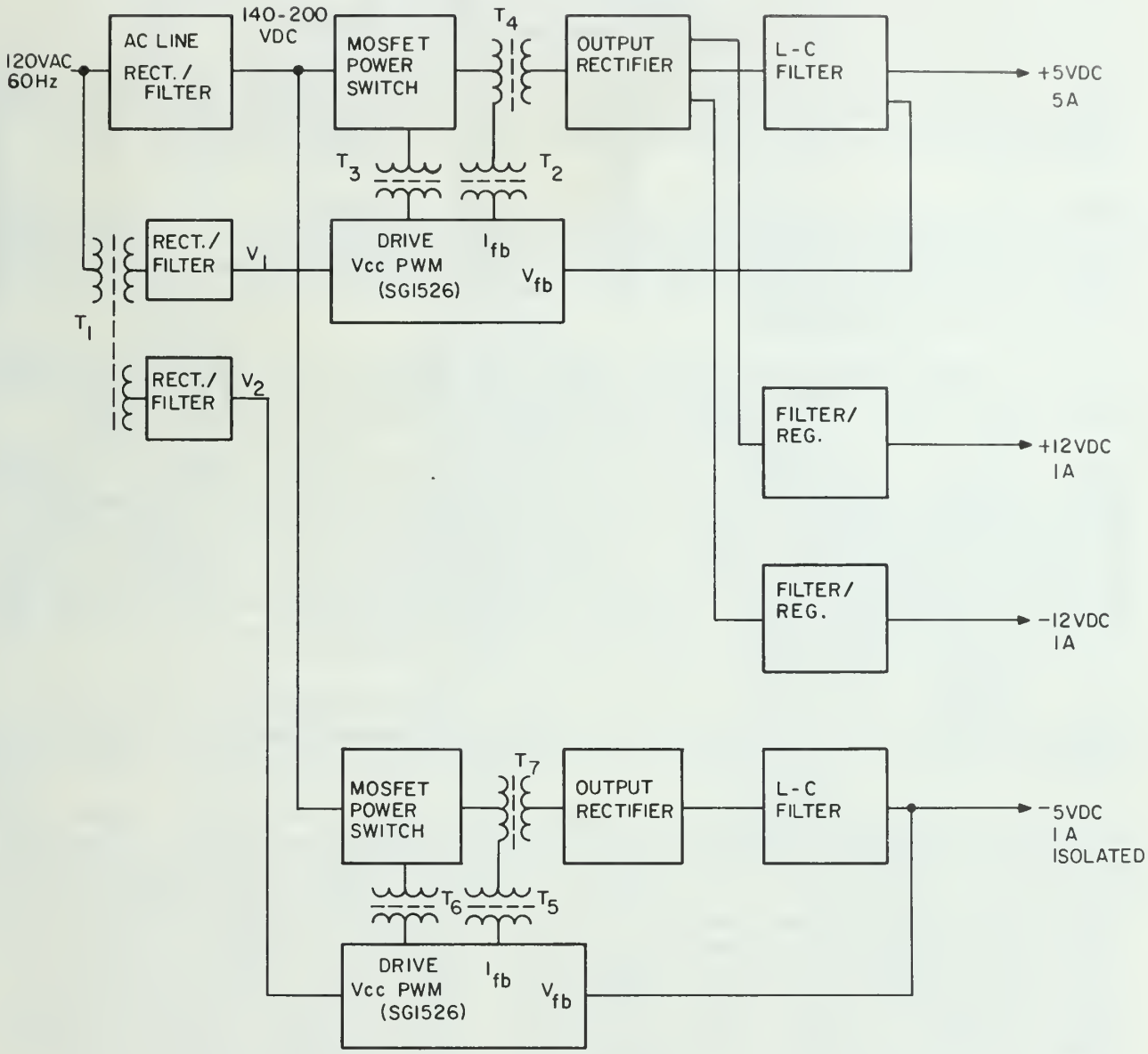


Figure 2-3. Power Supply No. 1 and No. 2 CCA N1A2A1/A2, Block Diagram

2.3.4.5 The ±12 voltages are derived from auxiliary taps and rectifiers coming from the IDE system +5 volt supply. They are regulated by a positive and negative three-terminal regulator IC.

2.3.4.6 The isolated +5 volt supply shares the line rectifiers and filters but is fully output-isolated from both the ac line and the IDE system. Again the isolation is obtained through isolation transformers for output, gate driver and current sample.

2.3.4.7 Each of the outputs has an indicator lamp on the front panel.

2.3.5 Synchro Converter CCA N1A2A3/A4 Functioning. (See figure 2-4)

2.3.5.1 The block diagram for the synchro converter CCA is shown in figure 2-4. As shown, the synchro converter CCA comprises a Scott T transformer, a quadrant selector circuit, sine and cosine multipliers, operational subtractor, error demodulator, VCO, threshold detector, integrator, and up-down counter.

2.3.5.2 Three-wire synchro angle data is presented to a Scott T transformer, which provides isolation from converter ground, and translates the synchro input data into two signals, one proportional to the sine of θ and the other proportional to the cosine of θ. The exact signal can be represented mathematically as a sine sinwt and a cosθ sinwt. Where w is the carrier frequency, this frequency will be removed by demodulation.

2.3.5.3 A quadrant selector circuit enables selection of the quadrant in which it lies, and automatically sets the polarities of the sineθ and cosθ signal appropriately for computational significance. The sineθ and cosθ outputs of the quadrant selector are then fed to the sine and cosine multipliers.

2.3.5.4 The sine and cosine multipliers are digitized by programmed, resistive networks. The transfer function of each of these networks is determined by a digital input which switches in proportioned resistors, so that the instantaneous value of the output is the product of the instantaneous value of the analog input and the sine or cosine of the digitally encoded angle 0. If the instantaneous value of the analog input to the sine multiplier is cosθ and the digitally encoded "word" presented to the line multiplier is 0, the output is cosθ sin0. Thus, the outputs of sine and cosine multipliers are cosθ and sin0 and sinθ cos0, respectively. These outputs are fed to an operational subtractor, so that the input to the demodulator is sin0 cos0- cosθ sin0 = sin (θ - 0).

2.3.5.5 The right-hand side of the trigonometric identity indicates that differencing-junction output represents a carrier frequency sine wave with an amplitude proportional to the sine of the difference between the angle to be digitized and 0 (the angle stored in digital form in an up-down counter).

2.3.5.6 The demodulator is also presented with the reference voltage, which has been isolated from the reference source, and appropriately scaled by the reference isolation transformer. The output of the demodulator is at analog dc level, proportioned to sin (θ - 0). In other words, the analog dc level is proportional to the sine of the error between the actual angular position of the synchro and the digitally encoded angle 0, which is the output of the counter. Note that the small errors (θ - 0) = θ -0. This analog error signal is then fed to the circuit block labeled "error processor" and VCO. This circuit consists essentially of an analog integrator whose output (the time integral of the error) controls the frequency of a voltage-controlled oscillator. The "sense" of the error (0 too high, or 0 too low) is determined by the polarity of (θ - 0) and is used to generate a counter control signal, which determines whether the counter moves upward or downward with each successive clock pulse fed to it. The "sense" comparators also have a small deadband that locks out the pulses to prevent the synchro converter from from toggling when the error is less than the required resolution, i.e., less than 0.1°. The up-down counter, like any counter, is functionally an integrator — an incremental integrator, but nevertheless an integrator. Therefore, the tracking converter constitutes in itself a closed-loop servomechanism with two lags. This is called a type II servo.

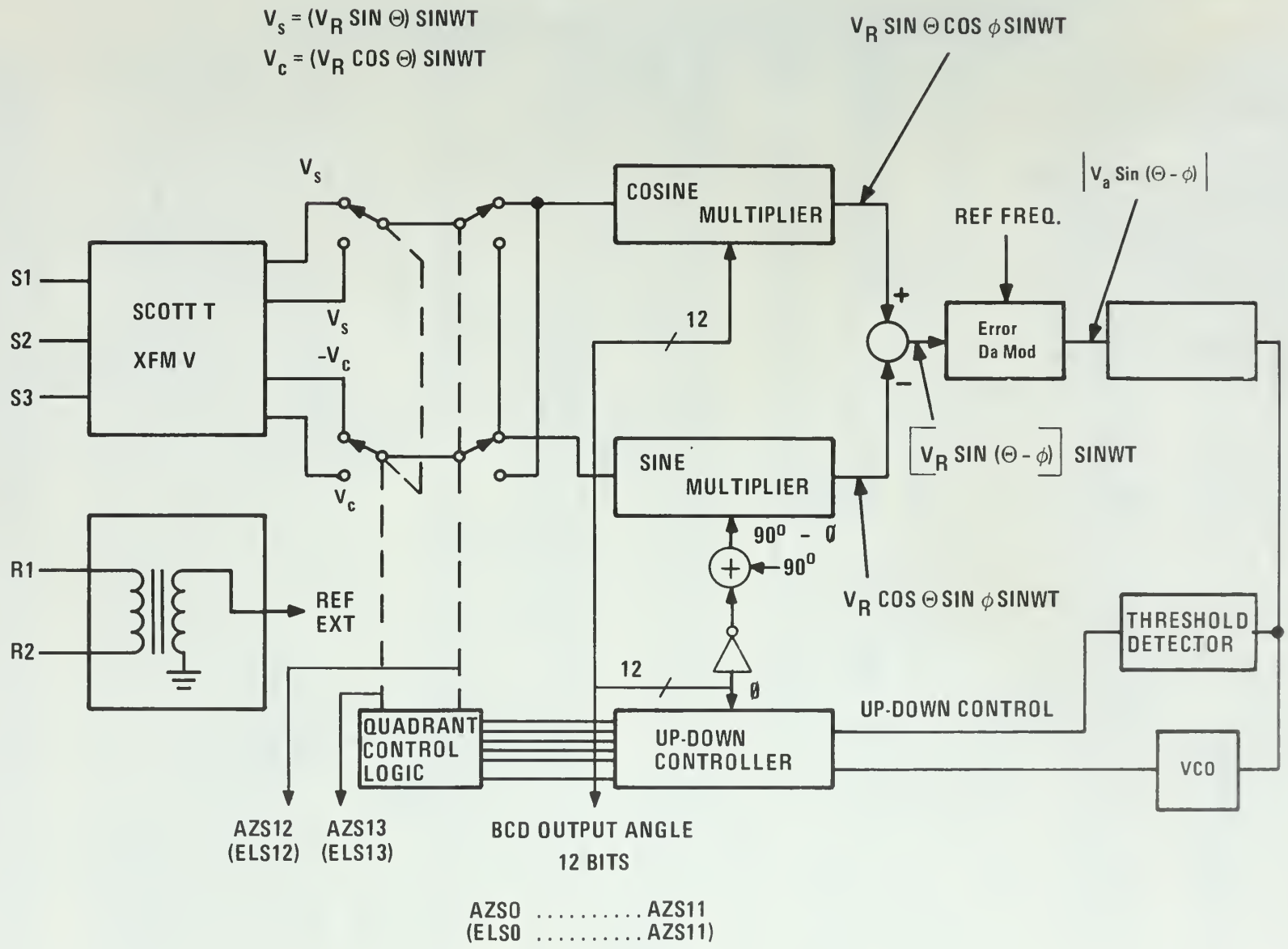


Figure 2-4. Synchro Converter CCA N1A2A3/A4, Block Diagram

2.3.5.7 The 14-bit BCD angle stored in the up-down counter is the encoded synchro angle information that is provided to the output CCA. The synchro converter CCAs are identical and are used for both the azimuth and elevation synchro conversion. The 14-bit converter output is a pseudo BCD code in that the lower order digits are BCD and the high order digit is in fact quadrant information. The synchro output CCA thus accepts the 14-bit word, level-shifts the lower order digits and through ROM look-up tables converts the quadrant information into the high order BCD digits required. The azimuth angle digits are then multiplexed to the data bus.

2.3.5.8 The Elevation 14-bit code goes through this same conversion to yield a pure BCD angle. However, the elevation angle goes through another set of ROMs, which shifts the numerical value to correct for both antenna 2.5 to 1 synchro ratio and to obtain plus and minus angles for elevations above and below horizontal. The elevation angle data is then applied to the IDE mux data bus.

2.3.6 Synchro Output CCA N1A2A5 Functioning. (See figure 2-5)

2.3.6.1 Figure 2-5 shows a block diagram of the synchro output board. It is divided into two sections. One section is for the azimuth synchro information; the other section is for the antenna elevation. Also, the isolated synchro reference transformer is contained in the board.

2.3.6.2 The function of the synchro output board is to provide a look-up table for mapping the digitally encoded (12 bits for 0° to 89.9° and 2 bits for quadrant) angle information into the normal (0° to 359.9°) angle format.

2.3.6.3 All the signal lines from the synchro converter board are level-translated and inverted through the FET bilateral switches.

2.3.6.4 In the azimuth section, the tenths and unit digit information from the synchro converter board are used directly to form the tenths and units digits of the final output angle. The tens digit and quadrant information, however, must first go through a loop-up table PROM to map into the hundreds and tens digits.

2.3.6.5 The basic operation is the same for the elevation section except there is a 2.5 to 1 gear ratio involved with the elevation synchro. Thus additional look-up tables are involved, and the outputs of these tables must be added together to form the correct BCD representation of the true elevation angle.

2.3.6.6 The final BCD outputs of both angle information are tied together through the tri-state buffers and form a data bus to the transmitter board. Strobes from the transmitter board determine when to latch the correct angle information into its bus.

2.3.7 DE Receiver CCA N1A2A6 Functioning. (See figure 2-6)

2.3.7.1 Figure 2-6 shows a block diagram of the IDE serial receiver CCA. The main purpose of this board is to test/monitor the serial data by reconstructing and displaying on LEDs and oscilloscope. The receiver is an asynchronous system operated at 14.31818 MHz (8 times the input data rate). Synchronization with incoming data depends upon the detection of level transitions and the correct framing of data bits (valid start bit, parity bit, 8-bit data, and stop bit). This is accomplished by the edge detecting circuit, the parity generator, and the framing logics. The divider counter and decoding circuit are used to generate strobe signals at the center of each data bit time to ensure noise free data latch. An 11-bit counter keeps track of the number of bits shifted into the serial-in-parallel-out (SIPO) shift registers, thus checking the framing of a data field (11 bits). When a correct framing of data field is recognized, the 8-bit data will be latched into the data latch. At the same time a DATA strobe will be generated to enable the data latch at the clock display board.

2.3.7.2 The sync byte decoder detects an FF in the 8-bit data. If an FF is detected, the serial data coming in will consist of auxiliary data bytes, and the auxiliary data byte counter will be enabled to count from 0 to 9. Its BCD outputs are decoded by a BCD to decimal decoder to give 10 data strobe signals for each auxiliary data byte. These sequential data strobes are used by the clock and display board to latch the corresponding data bytes to the 7-segment displays.

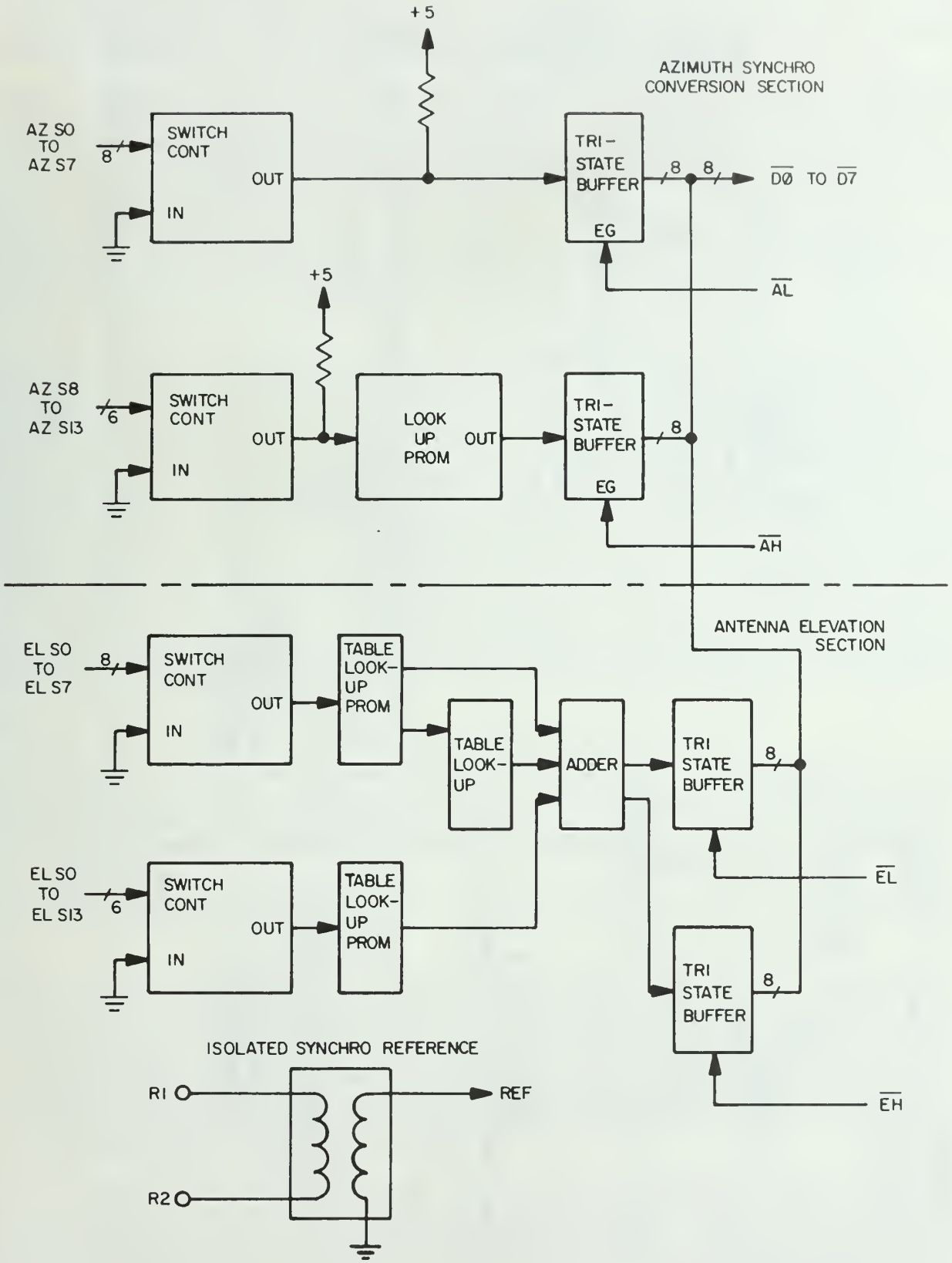


Figure 2-5. Synchro Output CCA N1A2A5, Block Diagram

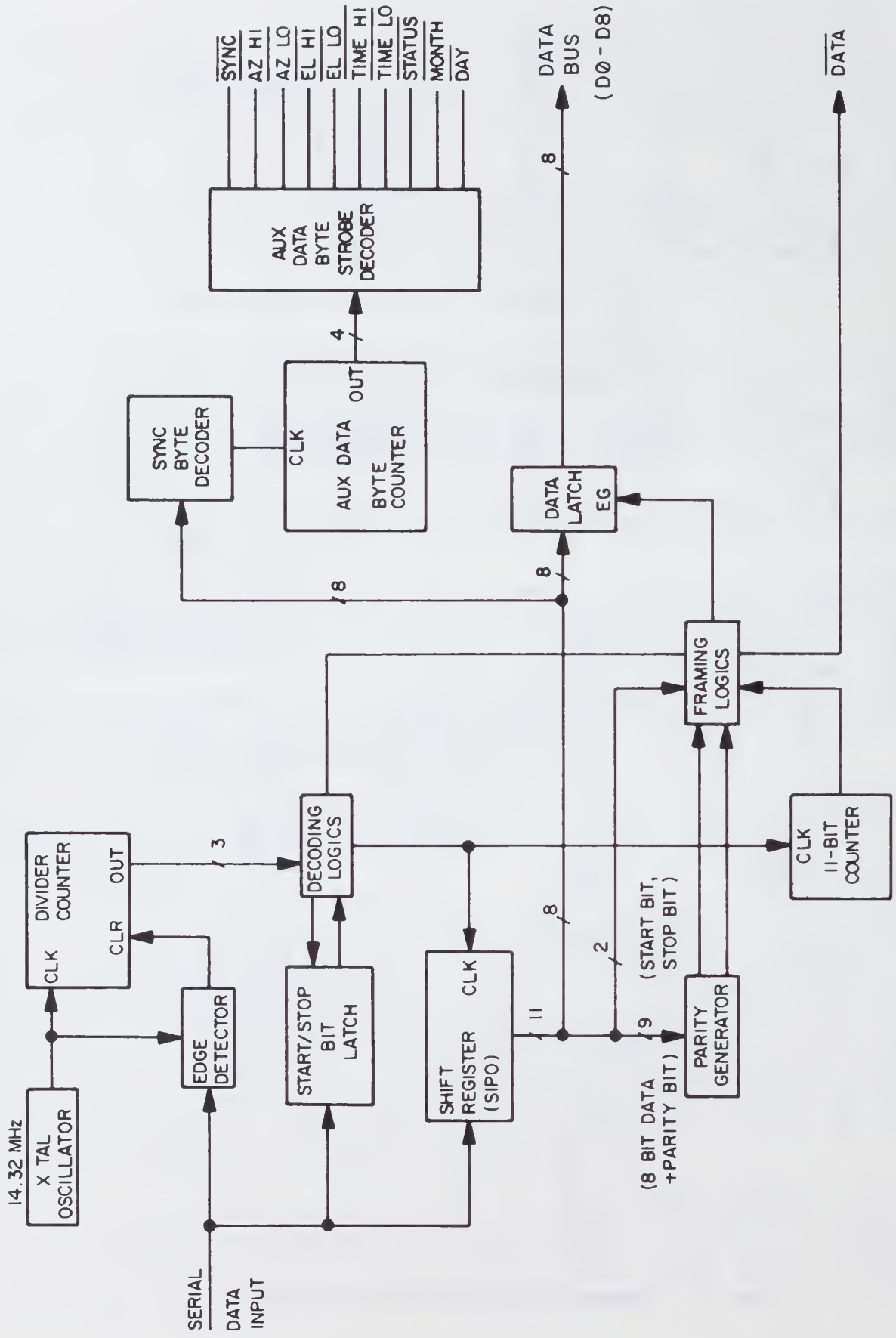


Figure 2-6. DE Receiver CCA N1A2A6, Block Diagram

2.3.8 Clock/Display CCA N1A2A7 Functioning. (See figure 2-7)

2.3.8.1 The block diagram for the clock/display CCA is shown in figure 2-7. As shown, the board is functionally divided into two sections: the clock section and the display section.

2.3.8.2 The display section receives parallel data from the IDE receiver CCA. This data is multiplexed data continuing the DVIP video data and the auxiliary data and is gated into two sets of latches. The first set is used to latch the DVIP data, which is then fed to a D/A converter to provide an analog presentation of the video signal. The current source output of the DAC is converted into a voltage output by an operational amplifier whose output is fed to a transistor driver to drive the BNC output connector on the front panel. The other set of latches is used to latch the auxiliary data (time, day, status, azimuth and elevation). Only the desired information selected by the front panel monitor switch will be latched. This is done through a pair of data selector/multiplexers. The encoded monitor switch function selects the data strobe to clock the latches. The outputs of the latches will be used by display mounting board No. 1, where they will be converted into 7-segment format.

2.3.8.3 The clock section provides the data and time DVIP data for the IDE. The time keeping function is performed by a single integrated circuit clock chip. A crystal controlled oscillator and a clock divider provides the 60 Hz time base for the chip. Time and date outputs are 7-segment outputs with four digits, and they share the same output lines. Four 7-segment to BCD decoders are used to convert the output to BCD format before they are stored in latches. An oscillator/timer and a select logic circuit are used to externally multiplex the clock chip so that it will put out date and time information alternately at its output by controlling the calendar/snooze input of the clock. The select logic also provides strobes to latch the BCD information into the latches. There are two sets of latches: one set is for storing the time information, and the other is for storing the date information. The tri-state outputs of these latches are tied together and buffered before they are routed to the data bus of the transmitter board. Data strobes from the transmitter board enable the latches to allow either the time or the date information to get onto the bus. Time and date settings of the clock are done by decoding the clock mode select switch signals from the front panel and with the activation of the FAST, SLOW, HOLD buttons (also on the front panel). The clock section also includes a power failure monitor which will detect a low battery voltage during power failure and indicate the condition by jamming invalid time information to the displays.

2.3.9 DE Transmitter CCA N1A2A8 Functioning. (See figure 2-8)

2.3.9.1 A block diagram of the transmitter CCA is shown in figure 2-8. It is comprised of a 14.3 MHz crystal oscillator, a shift clock counter, 11-bit counter, auxiliary data byte counter, BCD to decimal decoder, various logics to generate clock signals (the DATA/AUX DATA detect circuit, one shot and flip-flop), tri-state buffers, parity generator, parallel-to-serial shift register, transistor arrays and an 8-to-1 multiplexer.

2.3.9.2 The crystal oscillator is divided by the shift clock counter to 1.79 MHz, which is the data rate at which serial data is to be transmitted.

2.3.9.3 Parallel 8-bit data (DVIP data and auxiliary data byte) from the input buffer board are converted into an 11-bit serial format (one stop bit, 8-bit data, one odd parity bit, and one stop bit) and ouptut to different channels in the transmitter CCA. This conversion into serial bit stream requires the latching of data bytes at a time when all data bits are stable on the data bus. This timing is provided by the DATA READY from the radar for DVIP data, and the 11-bit counter for the auxiliary data. Clocking of DVIP data at the negative-going edge of DATA READY is desired. These two latching-enable signals are gated together at the OR gate and enable the shift clock counter to clock the shift registers through the one shot and flip-flop circuits.

2.3.9.4 The DATA/AUX DATA detect circuit is a retriggerable monostable multivibrator circuit which provides a low output at $\overline{Q}$ during DVIP data time. At the end of the DVIP data, it goes to HIGH and enables the 11-bit counter and the AUX DATA BYTE counter to count. The AUX DATA BYTE counter counts the number (10) of auxiliary data to be serialized. Its BCD coded outputs are decoded by a BCD-to-decimal decoder which provides the 10 data stroke signals ($\overline{DAT}$, $\overline{SYN}$, $\overline{AH}$, $\overline{AL}$, $\overline{EH}$, $\overline{EL}$, $\overline{TH}$, $\overline{TL}$, $\overline{ST}$, and $\overline{MO}$) to latch the appropriate data byte onto the bus.

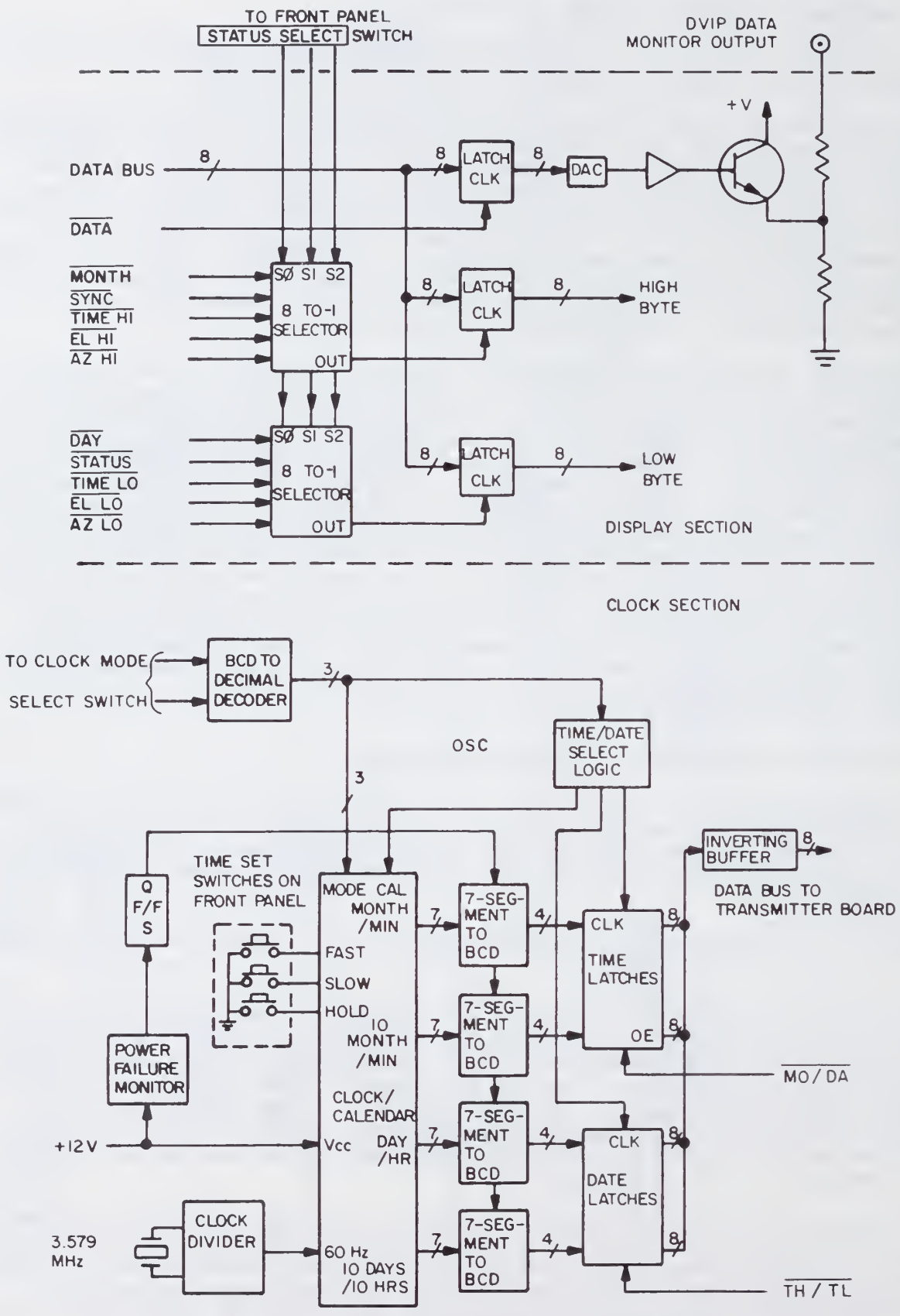


Figure 2-7. Clock/Display CCA N1A2A7, Block Diagram

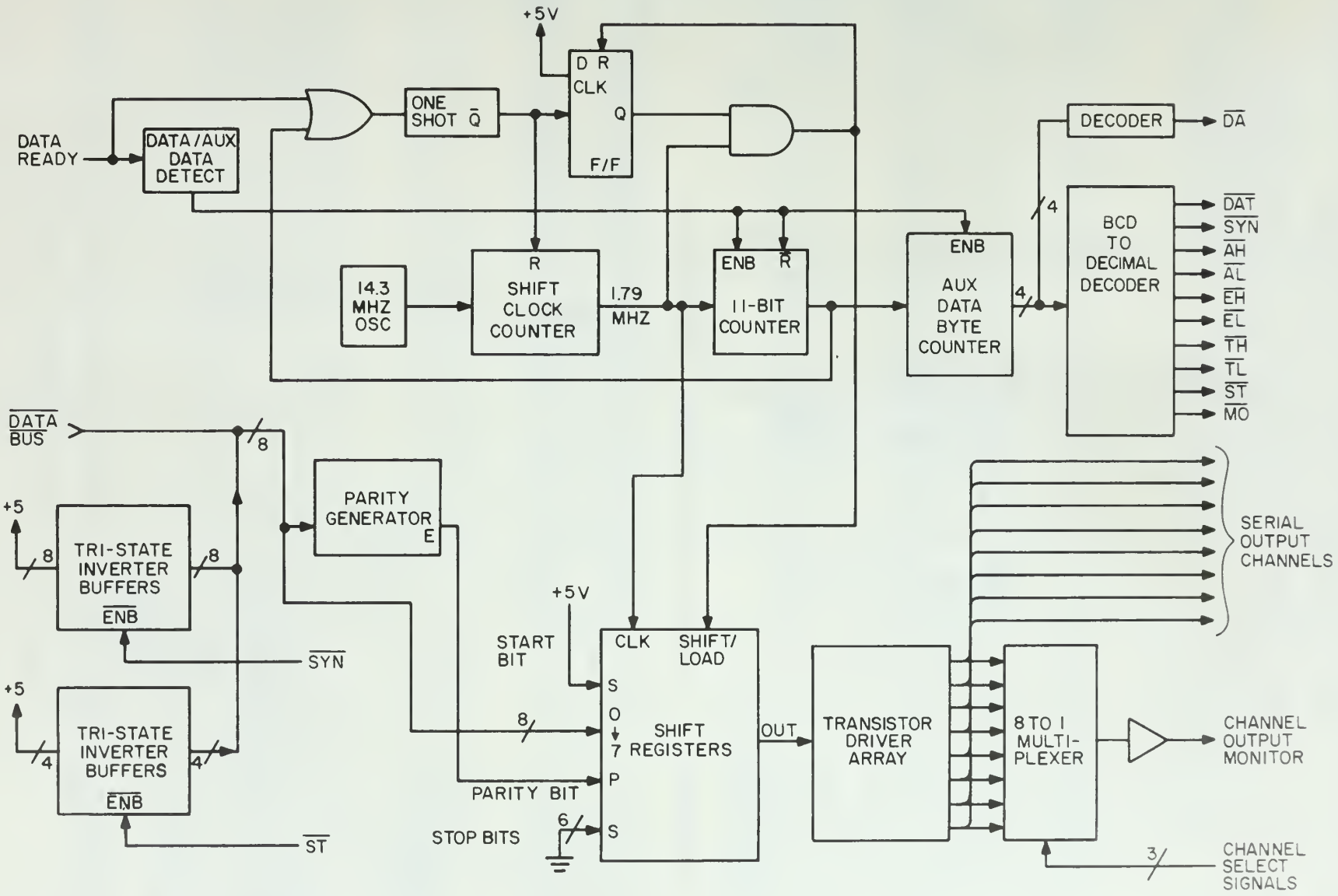


Figure 2-8. DE Transmitter CCA N1A2A8, Block Diagram

2.3.9.5 The 8-bit data bytes to be serialized are input from the data bus. Additional tri-state buffers are gated to the bus to provide the sync byte (FF) and the unused most significant four bits (zeros) for the status byte. The four LSBs for the status byte are already on the data bus.

2.3.9.6 In order to generate an 11-bit pattern mentioned earlier, a start bit, an odd parity bit generated by the parity generator, and stop bits are inserted in their appropriate places in the shift registers. The serial output is then used to drive an array of transistor drivers to distribute the data to 8 different channels. All these channels can be monitored separately on a scope through an 8-to-1 multiplexer and select lines from the front panel switch.

2.3.10 Input Buffer CCA N1A2A9 Functioning. (See figure 2-9)

2.3.10.1 The block diagram for the input buffer CCA is shown in figure 2-9. As shown, the input buffer CCA comprises the opto isolator section, schmitt trigger inverters, tri-state data buffers and driver circuits.

2.3.10.2 Radar output signals to the input buffer board include system trigger, DVIP data (8 bits), data ready, and radar signals (time sample, range coverage, test level, and IF attenuation bypass mode) for both the WSR-74 and WSR-57 radars. In addition to these, the WSR-74 also provides the Azimuth BCD information and the antenna elevation BCD information. All these signals are optically isolated from the radar and are mulitplexed onto an 8-bit data bus through the use of tri-state buffers. Signals from the transmitter board, the data enable strobes, are used to enable the required data to be latched onto the data bus at the required time.

2.3.10.3 The system trigger input is first conditioned through a comparator before being isolated and buffered. It is used to provide a synchronized trigger output for external triggering. For the WSR-74 radar, it is also used to generate the AZ INHIBIT and ANT ELEV INHIBIT signals required by the radar.

2.4 DETAILED FUNCTIONING.

2.4.1 DE Power Supply No. 1 and No. 2 CCA N1A2A1/A2. (See figure 10-23)

2.4.1.1 The IDE power supply is a redundant system employing dual, independent off-line switching converters. Each power supply is complete on a single circuit card assembly and supplies all four voltages required for system operation. These are +5 Vdc, +12 Vdc, −12 Vdc and an isolated 5 Vdc for radar interface circuits. In addition, all output voltages are isolated from the ac line by transformers. Each of the two circuit cards has a full-wave bridge to recify the ac line and a L-C filter. This off line voltage is used on the primary side of two switching converters to be discussed later (see figure 2-10).

2.4.1.2 A small ac line transformer T7 supplies a separate dc voltage to each of the pulse width modulation (PWM) ICs (see figure 2-11). The secondary of transformer T7 has two windings. The output voltage of these windings is rectified and filtered. One output is grounded through the system ground, and the other is floating and isolated.

2.4.1.3 A switching converter with 5 Vdc and ±12 Vdc output voltages (see figure 2-12) is an off-line half bridge converter. The dc voltage is switched at 100 KHz rate in the primary winding of the transformer T4. Two power MOSFET transistors, Q4 and Q5, are connected in a half-bridge configuration, which acts as the power switch. The transistors' gates are driven by a low power transformer T6. The primary of the transformer is coupled to the output of the PWM IC. This IC has all the control needed for voltage regulations and current-limiting. The voltage regulation is achieved by sampling a scaled value of the output voltage. This voltage is fed to the input of the error amplifier of the IC. The result of this control loop is a pulse width modulation to the primary of the output transformer which maintains the output regulation.

2.4.1.4 The current-limiting is a separate input to the IC from 1:1 ratio transformer T5 used as a current sampling in the primary of the output transformer T4. The current limit is a foldback mode, which triggers the IC's slow start circuit.

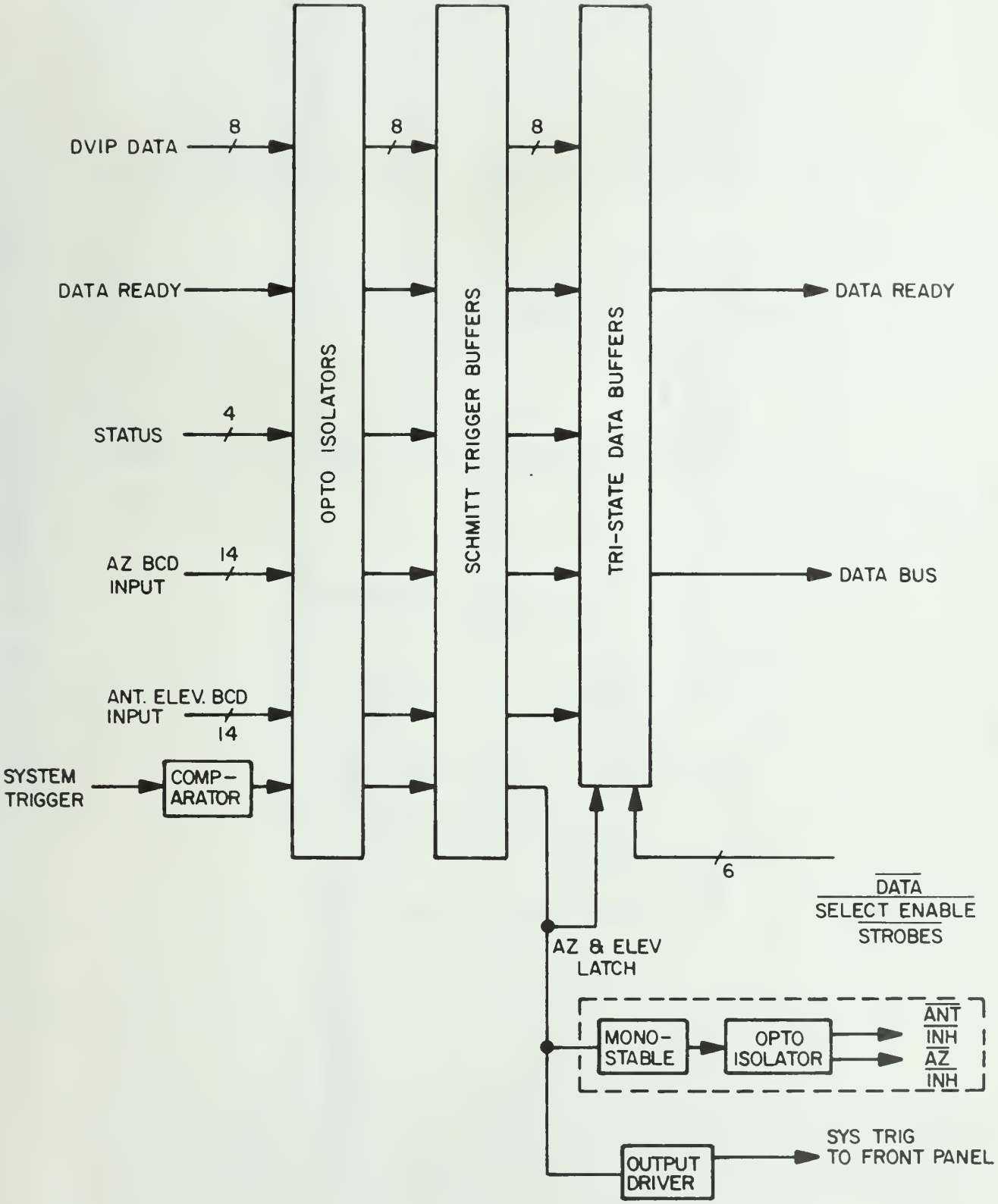


Figure 2-9. Input Buffer CCA N1A2A9, Block Diagram

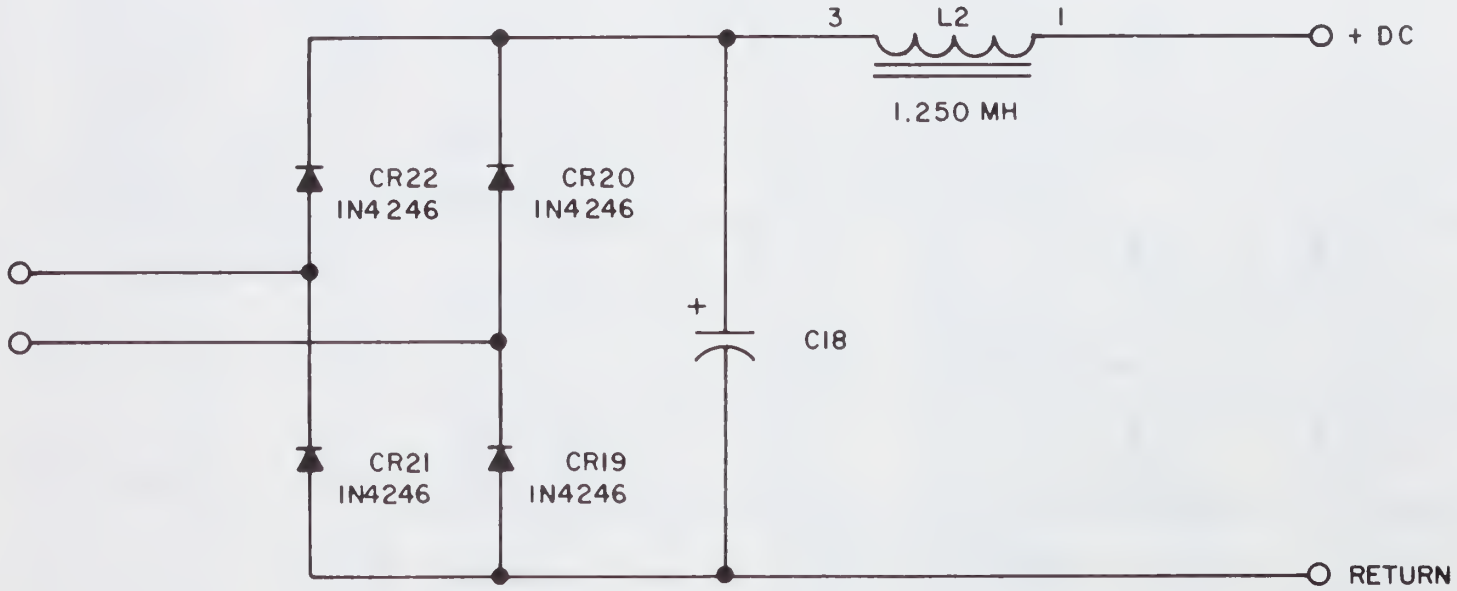


Figure 2-10. Input Rectifier and Filter

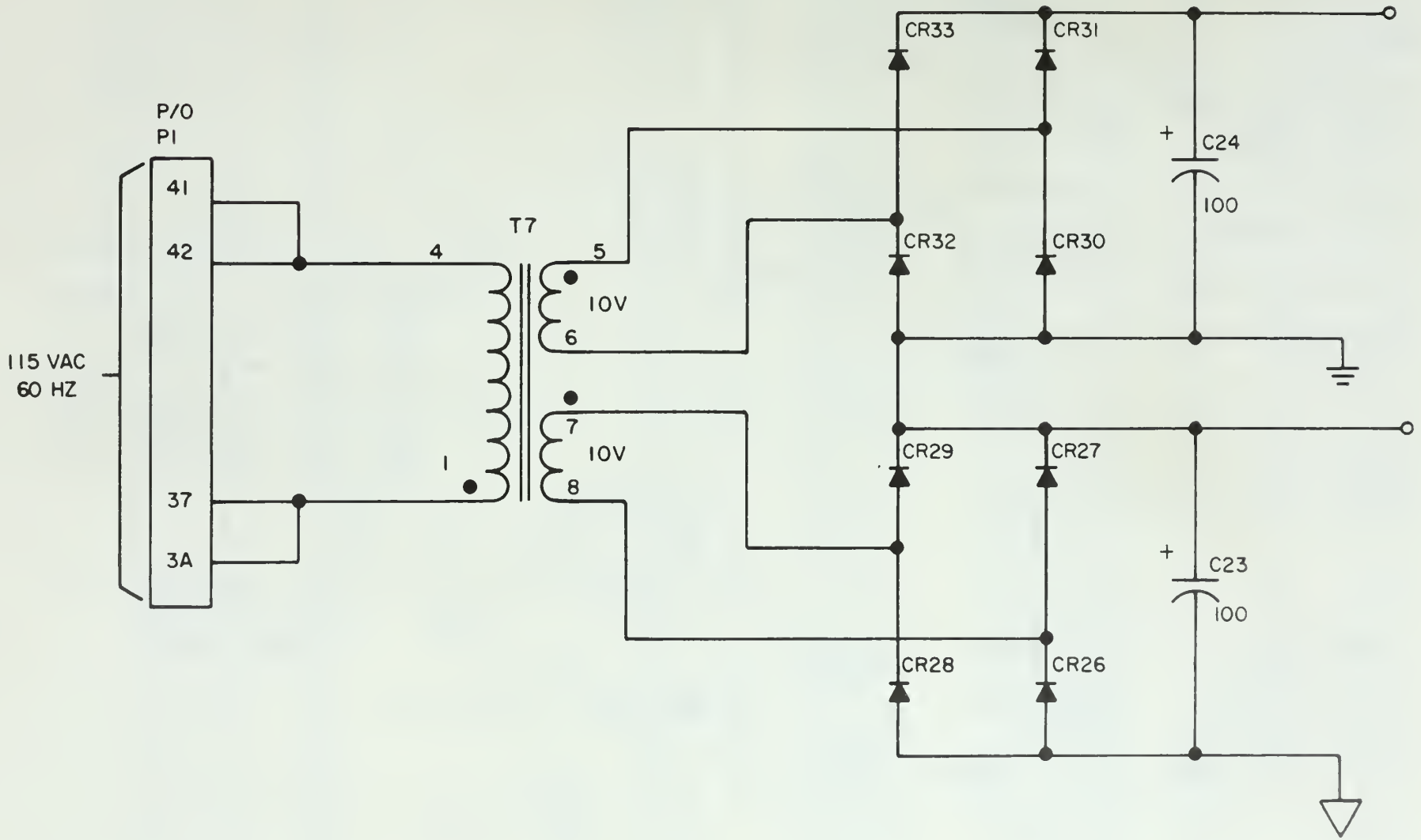


Figure 2-11. Control IC Supply

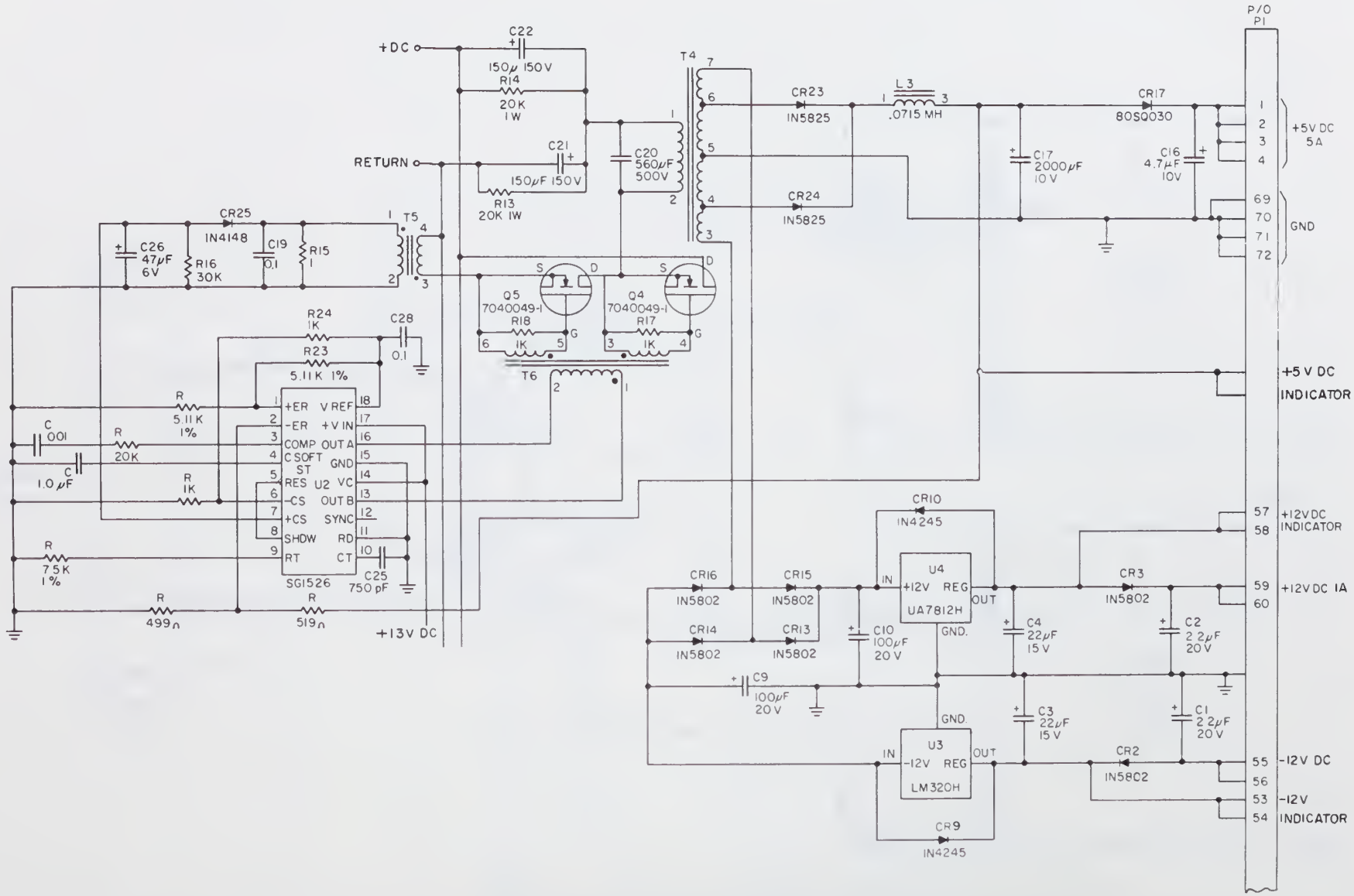


Figure 2-12. Switching Converter with 5 Vdc and ±12 Vdc Output Voltages

2.4.1.5 The secondary of the ouptut transformer is multitapped. Taps 4 and 6 are dedicated to the 5 V output. Taps 7 and 3 are for the ±12 V output. The output voltage of taps 4 and 6 is rectified through a full wave bridge and filtered by a L-C filter. This is the only voltage which is sampled and regulated by the Control IC U2.

2.4.1.6 The output of taps 7 and 13 is rectified and filtered by capacitors. The regulation on the ±12 V is achieved by a positive U4 and a negative U3 three-terminal voltage regulator IC.

2.4.1.7 The output voltages of this card are connected to their respective voltages on the redundant card through an isolation rectifier. This supply is capable of supplying all the power requirements in case of a failure by the power supply on the redundant card.

2.4.1.8 A switching converter with an isolated 5 Vdc output (figure 2-13) is a flyback, off-line switching converter. The dc voltage is switched at 100 KHz rate in the primary winding of transformer T1. The output is isolated from the ac line and IDE system. The IC power is obtained from an isolated winding Taps 7 and 8 of transformer T7. The power switch is a high voltage MOSFET transistor Q3. The gate is driven by the secondary of transformer T2. The primary of T2 is coupled to the PWM IC U1. The voltage regulation is achieved by control loop. The output voltage is scaled and fed to the error amplifier of the PWM IC. This results in a pulse width modulation on the primary of transformer T1, which in turn regulates the output voltage.

2.4.1.9 The current limit is achieved by sampling the current by a 1:1 ratio transformer T3 in the primary side of the output transformer T1. The output of T3 is rectified and filtered, then fed to the "CURRENT SENSE" of the PWM IC. The current limit is a foldback mode, which triggers the IC's slow start circuit. The output of transformer T1 is rectified and filtered by a L-C filter. The SV terminal of this card is connected to its respective SV terminal on the redundant card through an isolation diode CR6.

2.4.2 Synchro Converter CCA N1A2A3/A4. (See figure 10-24)

2.4.2.1 T1 is a Scott-T transformer, which resolves the three-wire synchro inputs (S1, S2 and S3) into two pairs of isolated output voltages at the carrier frequency whose amplitudes are proportional to the sine and cosine of the angular position θ of the shaft. Thus the outputs at terminal 4, 6, 7 and 9 can be represented respectively by:

$$V_4 = K \sin\theta \sin wt$$

$$V_6 = -K \sin\theta \sin wt$$

$$V_7 = K \cos\theta \sin wt$$

$$V_9 = -K \cos\theta \sin wt$$

where K is a constant and w (= 2 f) represents the carrier frequency.

2.4.2.2 U21 and U22 are dual four-channel analog multiplexers which serve as the quadrant selector to switch the appropriate sine and cosine voltage with the correct polarities into the sine and cosine multiplier. Quadrant selection is done by the most significant 2 bits of the BCD encoded angle θ.

2.4.2.3 The digitally encoded angle θ, which is generated to match the actual angular position (θ) of the synchro, i.e., (θ - θ) = 0, comes from a set of decode counters U6, U7, U8, U9 and U25 cascaded together. U6 is the least significant digit, representing the hundredth degree; and U9 is the most significant digit, representing the tens. Only the most significant 12 bits (AZ/EL SO - AZ/EL S11) will be used to represent the synchro angle (between 0° and 90°), and only two bits are used in U25 (AZ/EL S12 and AZ/EL S13). These two bits represent the quadrant in which the angle lies (see figure 2-14) and are used for quadrant selection.

QUADRANT	AZ/EL SI3	AZ/EL SI2	SIN	COS
I	1	0	+	+
II	1	1	+	−
III	0	0	−	−
IV	0	1	−	+

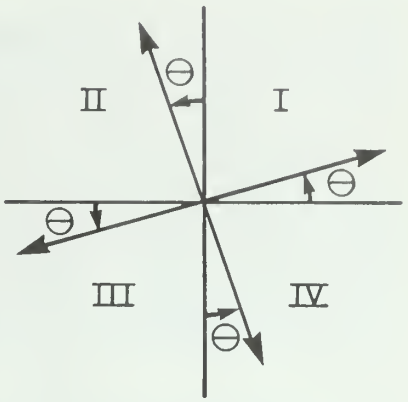
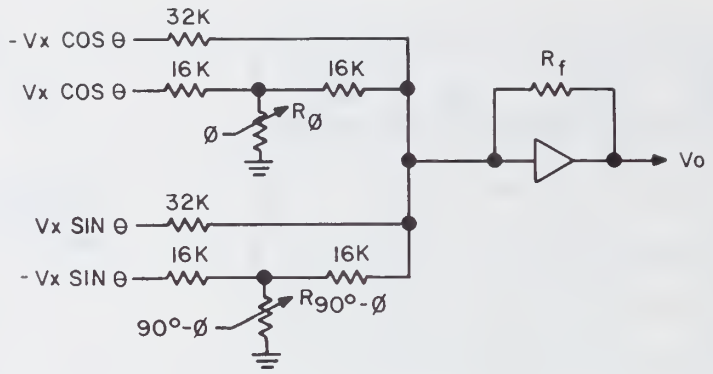


Figure 2-14. Quadrant Representation and Actual Polarities for Sine and Cosine

2.4.2.4 According to the quadrant selection table in figure 2-15, the outputs of U21 and U22 are always the same as in quadrant I, taking into account the change in polarities of sine and cosine in different quadrants. These four outputs are fed to an operational amplifier summer (U33) through various weighted resistive networks. The equivalent circuit is shown in figure 2-16.

QUADRANT	A	B	U22 X	U22 Y	U21 X	U21 Y
I	1	0	− COS θ	+ COS θ	+ SIN θ	− SIN θ
II	1	1	− SIN θ	+ SIN θ	− COS θ	+ COS θ
III	0	0	+ COS θ	− COS θ	− SIN θ	+ SIN θ
IV	0	1	+ SIN θ	− SIN θ	+ COS θ	− COS θ

Figure 2-15. Quadrant Selection and Output Polarities



where V_x = K Sinwt (w - 2 π 60 Hz)

Figure 2-16. Operational Amplifier Summer Equivalent Circuit

2.4.2.5 $R_\emptyset$ is actually a weighted resistor network, whose value is determined by the digital angle $\emptyset$. The BCD coded angle switches in weighted resistors through the bilateral switches U2 through U5 and the FET switch Q1. $R_{90°-\emptyset}$ is also a weighted resistor network except it is controlled by $90°-\emptyset$ instead of $\emptyset$. This is done by inverting the angle $\emptyset$ through inverters U11 and U12 and then adding it to 90 by adders U13 through U16. The B inputs to these adders are preset at 10 except U16, which is preset to 9 (most significant digit). With the carry inputs at zero, this is the BCD equivalent of adding 90. The output of these adders then switches in resistors through switches Q2 and U17 through U20.

It can be easily shown that

$$R_0 = \frac{1.28}{\emptyset} \text{ M ohm} = \frac{90}{\emptyset} 14.22 \text{ K ohm}$$

$$R_{90-0} = \frac{1.28}{90-\emptyset} \text{ M ohm} = \frac{90}{90-\emptyset} 14.22 \text{ K ohm}$$

Thus the output voltage V_0 is equal to

$$V_0 = R_f \left(\frac{-V_x \cos\theta}{32K} + \frac{V_x \sin\theta}{32K} + \frac{V_x \text{vis}\theta}{16K + 16K \quad R_\emptyset} - \frac{V_x \sin\theta}{16K + 16K \quad R_{90-\emptyset}} \right)$$

$$= \frac{V_x R_f}{32K} \left[- \left(\frac{90-\emptyset}{250-\emptyset} \right) \sin\theta + \left(\frac{\emptyset}{\emptyset + 160} \right) \cos\theta \right]$$

$$\frac{VxRf}{32K} \left(\sin\theta \cos\theta - \cos 0 \sin 0 \right)$$

$$\frac{V_x R_f}{32K} \sin(\emptyset - \theta)$$

2.4.2.6 Thus for $\Theta = 0$, the voltage ouptut V_0 has to be zero. This output voltage is, therefore, used as an error signal voltage to correct for 0 as in a close loop servomechanism action. The error voltage first goes through a noninverting amplifier U28A with a gain of about 5.5 $\left(= 1 + \frac{68K}{14K} \right)$. After it is amplified, it goes into a demodulator/sign inverter consisting of U28B and U28D, Q4 and Q5. FET switches Q4 and Q5 are controlled by the reference voltage, which is derived from the synchro references R18R2. It is transformer isolated in the synchro output board and then voltage-limited by diodes inside the transformer block. U28D is an open-loop buffer amplifier to square up the reference signal and is then used to turn on or off Q4 and Q5 through diode CR6. When the reference voltage is positive, Q4 and Q5 are both off so that the output of U28B is the sum of the voltages through the noninverting amplifier gain and the inverting amplifier gain for the same error voltage. The result is an amplifier with a positive unity gain. When the reference is negative, Q4 and Q5 are ON so that the error voltage will go through the inverting amplifier with negative unity gain.

2.4.2.7 After demodulation, the error voltage is integrated by integrator U28C with adjustable offset control R73. This adjustment should be set at the factory or depot using a synchro standard and is not meant for field service. The time changing integrator output is then fed to a window detector (U29C and U29D) and a full wave rectifier (U29A and CR5), which, in turn, drives a voltage comparator operational amplifer with hystersis built into it through feedbacks. The output of the comparator acts as a voltage-controlled current source to charge C30 for the LM555 oscillator. The charging rate of the capacitor determines the frequency of the oscillator; hence we have a voltage-controlled oscillator (VCO).

2.4.2.8 The window detector has its threshold levels set to ± 70 mV by resistor dividers. The outputs of comparators U28D and U28C are gated together at U23A so that if the integrated absolute output voltage increases above 70 mV, the 555 is triggered, and its output will go high. U23D inverts the output delayed through the RC combination R53 and C40 to disable U32D so that the trigger input is only a small, negative-going pulse. When the trigger input is low, C30 is discharged through an internal transistor. Now C30 will begin to charge up by the current source. When it reaches 2/3 of the 14-volt VCC ($+7\text{ V} - (-7\text{ V}) = 14\text{ V}$), the threshold of 555 is reached; and it will reset its output to low, thereby enabling U32D again. If the error voltage is still within the window of detection, another trigger pulse will be generated. The capacitor will be discharged again, and the process repeats until the error voltage is close to zero.

2.4.2.9 The error correction is done by generating up-count and down-count pulses to the decode counter. U32C gating the output of 555 and its delayed inverted output will provide negative-going pulses for this purpose. These are, in turn, gated with the output of the window detector to determine whether it should be down-count or up-count pulse. U32A gates the pulses with the positive error to give down-count pulses while U32B gated them with negative error to give up-count pulses.

2.4.2.10 These clock pulses will clock counters U6, U7 and U8 cascaded together. U6 is the least significant digit (hundredth degree). The tens degree counter (U9) and quadrant counter (U25)) are clocked by other means.

2.4.2.11 U1A decodes "0" at the tens degree counter, and U1B decodes an "8." If the tens degree is 0 when a borrow occurs at pin 13 of U8 due to a down-count pulse, U23B and U24C are disabled so that U9 will not be counted down. Instead, the BRW pulse will reset a JK flip-flop U27A and clock another JK flip-flop U27B to the "one" state (since both J and K inputs are "1" and its previous state is "0"). Thus Q1 is HIGH to enable the borrow pulse to go through U24D and will load U9 with an "8."

2.4.2.12 If U9 counts to "8" and a carry occurs at pin 12 of U8 due to an up-count pulse, U1B will disable U23C and U24B. The carry-pulse will clock U27A to "1" state and reset U27B. Q2 being HIGH will allow the carry pulse to clear U9 to "0" through U24A and U10F.

2.4.2.13 The quadrant counter will count up when the tens degree is an "8" and a carry pulse occurs at U8. This is done through U26B. It will count down if the tens degree is "0" and a borrow occurs at U8. U26C gates these two conditions to give the down-count pulse.

2.4.3 Synchro Output CCA N1A2A5. (See figure 10-25)

2.4.3.1 The tenths and unit azimuth information lines AZS0 through AZS7 are used to control the bilateral switches U24 and U25. A low on the line (−7.5 V) will turn off the switch; and the output side of the switch is therefore high due to the pull-up resistors (4.7 K). A high on these lines (+7.5 V) will turn on the switch and connect the grounded inputs to the outputs. Thus, U24 and U25 invert the signal polarities and also provide a level translation to the signal. Outputs of U24 and U25 are fed to tri-state buffer U17, and they provide the tenths and unit BCD information of the azimuth angle.

2.4.3.2 The tens and quadrant azimuth information lines (AZS8 through AZS13) are used to control switches U23 and U22. A complemented AZS13 is obtained through U21A as an additional input. Thus, AZS13 is used as a chip select signal for selecting the lookup PROMs U19 and U18. In the I and II quadrants, AZS13 is low; thus U19 (PROM A) is selected. In the III and IV quadrants, U18 (PROM A) is selected. The output from the switches is used as address lines to read out the PROM contents. The contents for PROM A and B are given in table 2-1. The outputs of U18 and U19 are pulled up by resistors and fed to tri-state data latch U20.

2.4.3.3 Thus, U20 provides the first two digits (hundreds and tens) and U17 provides the last two digits (unit and tenths) of the azimuth angle. Their outputs are tied together to the input data bus of the transmitter board. Strobe $\overline{AL}$ from the transmitter board wil enable U17 while $\overline{AH}$ will enable U20.

2.4.3.4 The tenths and unit elevation information (ELS0 through ELS7) is used to control switches U3 and U4 whose outputs become the address lines to PROM 1 (U10) and PROM 2 (U9). These two PROMs are essentially look-up tables which divide the tenths degree and the unit degree by 2.5 (see table 2-2).

2.4.3.5 The tenths and quadrants information (ELS8 through ELS13) is used to control switches U1 and U2, whose outputs become address lines to PROM A (U7) and PROM C (U6). ELS13 and its inversion through U21B select either PROM A or PROM C, depending on the quadrant. In quadrant I or II PROM A is selected. It serves as a look-up table for another address used to read another look-up table, PROM 3 (U8). PROM 3 is another divided by 2.5 look-up table for the number of tens degree. If the angle is in quadrant III or IV, PROM C is selected. The address data readout from PROM C would then be used to read PROM 3. PROM 3 again gives a value equal to 1/2.5 of the number of 10s degree for this angle.

2.4.3.6 U11 through U14 are BCD adders which put the tenths, unit, tens and hundreds degrees together. U14 adds a 0.03 degree to the resultant angle readout from the PROMs so that it will round off the angle to the tenths degree. U13 adds the tenths degrees from PROM 2 and PROM 1 together. U12 adds the unit degrees from PROM 2 and PROM 3 together, and U14 adds the tens degrees from PROM 3 and PROM C or A together. The hundreds degree is derived from PROM A or C.

2.4.3.7 The outputs of the adders then go into 2 tri-state inverting buffers U15 and U16. The strobe from the transmitter board EL and EH will enable either the HIGH byte or LOW byte to get on the data bus.

2.4.4 DE Receiver CCA N1A2A6. (See figure 10-26)

2.4.4.1 During power up, the RC charging time constant created by R1 and C22 serves as a reset signal to clear flip-flop U17B and preset counters U2 to 1010 and U13 to 1011. Resetting of U17B enables U10A (which clocks the shift registers U15 and 16 and 11-bit counter U13), and disables U7A which, in turn, enables U9A so that only U7C can clock U17B.

2.4.4.2 The shift register clock is derived from the clock divider counter U21, whose input clock is the 14.31818 MHz crystal controlled oscialltor (U4A, B, and U3A). U21 is cleared whenever there is a level transition in the input data stream. This is done by flip-flops U18A and U18B, which are clocked by opposite polarity input data. U19A gives an OR function so that either a low to high or a high to low transition in the data will clear U21. Clearing of U21 will synchronize the input data with the internal clock.

Table 2-1. Contents of PROM A and PROM B for Azimuth Angles

	QUADRANT	I and II		III and IV	
	PROM	A (AZS13 = 1)		B (AZS13 = 0)	
	0 / ADDR	DATA (HEX)	REPRESENTING ANGLE	DATA (HEX)	REPRESENTING ANGLE
AZS12 = 0	0° 1F	FF	0°	ET	180°
	10° 1E	FE	10°	E6	190°
	20° 1D	FD	20°	DF	200°
	30° 1C	FC	30°	DE	210°
	40° 1B	FB	40°	DD	220°
	50° 1A	FA	50°	DC	230°
	60° 19	F9	60°	DB	240°
	70° 18	F8	70°	DA	250°
	80° 17	F7	80°	D9	260°
AZS12 = 1	0° 0F	F6	90°	D8	270°
	10° 0E	EF	100°	D7	280°
	20° 0D	EE	110°	D6	290°
	30° 0C	ED	120°	CF	300°
	40° 0B	EC	130°	CE	310°
	50° 0A	EB	140°	CD	320°
	60° 09	EA	150°	CC	330°
	70° 08	E9	160°	CB	340°
	80° 07	E8	170°	CA	350°
	OTHER ADDRESSES	FF ↓		FF ↓	

2.4.4.3 The input data bits are to be latched at the bit center time, which is about the 4th clock cycle (0.28 μs) after the start of a level transition or start of a data bit. This clock is obtained by decoding a 3 from the outputs of U21, using gates U3D and U20A. Thus at the 3rd clock cycle, output of U20A will go low so that at the 4th cycle it will go high to give the clock edge for latching and shifting U15 and U16. This same clock is also used to clock the 11-bit counter U13 which resets for every 11 bits (data frame length) of data shifted in.

2.4.4.4 At the end of the 11th bit count, if Qc (start bit position of U16) and Qa (stop bit position) of U15 are HIGH and LOW respectively, indicating a valid start bit and a stop bit are in their positions, both outputs of U7B and U6A will be LOW, and output of U10C HIGH to enable U7C. If these two bits do not meet the right polarities, nothing will happen; the data bits will be shifted in continuously until the conditions are met.

Table 2-2. Contents of PROM A, C, 1, 2 and 3 for Elevation Angles

	QUANDRANT / PROM / ADDR	0	I & II	III & IV	1		2		3	
			A (HEX)	C (HEX)	DATA (HEX)	ANGLE	DATA (HEX)	ANGLE	DATA (HEX)	ANGLE
EL S12 = 0		0°	1F	FF	D7				FF	
		10°	1E	FE	D6				40	40°
		20°	1D	FD	DF				44	44°
		30°	1C	FC	DE				48	48°
		40°	1B	FB	DD				52	52°
		50°	1A	FA	DC	FF	FF		56	56°
		60°	19	F9	DB				FF	
		70°	18	F8	DA				FF	
		80°	17	F7	D9				FF	
EL S12 = 1		0°	0F	F6	D8	00	.00°	00	0.0°	00	0°
		10°	0E	EF	D7	04	.04°	04	.4°	04	4°
		20°	0D	EE	D6	08	.08°	08	.8°	08	8°
		30°	0C	ED	DF	12	.12°	12	1.2°	12	12°
		40°	0B	EC	DE	16	.16°	16	1.6°	16	16°
		50°	0A	EB	DD	20	.20°	20	2.0°	20	20°
		60°	09	EA	DC	24	.24°	24	2.4°	24	24°
		70°	08	E9	DB	28	.28°	28	2.8°	28	28°
		80°	07	E8	DA	32	.32°	32	3.2°	32	32°
			06	FF	FF	36	.36°	36	3.6°	36	36°
	OTHER ADDR.		FF	FF	FF		FF		FF	

2.4.4.5 U9B and U10B, which decode a 1 or 9 (6 cycles after the shift clock), clock U17B to latch the next data bit in and reset U13. If this next data bit is low at 2D, indicating the start bit of the next data frame, the above process will repeat. If the next data bit is HIGH, indicating the possibility of extra stop bits or end of DVIP data, U10A will be disabled by the 2Q output of U17B. Thus, the shifting of data is disabled. 2Q, however, will enable U7A. The condition at U7B is held as previously, thus forcing output of U7C to be HIGH. U9A is, therefore, enabled. Now, U17B will be clocked at 1.79 MHz by U9B until a valid start bit is again latched into U17B.

2.4.4.6 At the end of each 11th bit count, certain logic will perform a data framing check to ensure that the 11-bit pattern of data shifted in truly represents a data frame of the correct format. U1C, U6B and U10C already checked the start bit and stop bit polarities as mentioned previously. The parity of the middle 9 bits is continually being checked for ODD parity (HIGH is ODD). If the framing is correct at the 11th bit count, U9D will give a data strobe DATA/AUX DATA at its output. If parity is not odd at the end of the 11th bit count, an ERROR will be decoded by U9C.

2.4.4.7 U30 checks the 8-bit data for sync byte (FF). U20C further verifies the sync byte by gating in the start bit and, if valid, will be clocked by the shift clock to reset the auxiliary byte counter U2. Subsequent shift clocks then clock U2 to keep track of auxiliary data bytes until the count of 12 is reached, at which time U6C decodes the two most significant bits to disable U2. During auxiliary data time (i.e., before U2 counts to 1100), U6C will give a HIGH output to U10D, which, in turn, disables U6B. During other times, U6B is enabled, and any valid data frame will indicate a valid DVIP data. Thus, U6B will provide the strobe DATA for DVIP data only. This signal is used by the clock display CCA. When U2 is active, its outputs will be decoded by U5 to provide the appropriate data strobes for the auxiliary data. The input to the decoder is enabled only for valid data frames by OR gates U8A through U8D. These data strobes are $\overline{\text{DAY}}$, $\overline{\text{MONTH}}$, $\overline{\text{STATUS}}$, $\overline{\text{TIME LO}}$, $\overline{\text{TIME HI}}$, $\overline{\text{EL LO}}$, $\overline{\text{EL HI}}$, $\overline{\text{AZ LO}}$, $\overline{\text{AZ HI}}$ and $\overline{\text{SYNC}}$. Together with DATA, they are used by the clock display CCA to latch the correct information for display and monitoring purposes.

2.4.5 Clock/Display CCA N1A2A7. (See figure 10-27)

2.4.5.1 The multiplexed data bus (D0 through D7) from the receiver board is demultiplexed with the data strobes (DATA, $\overline{\text{DAY}}$, $\overline{\text{STATUS}}$, $\overline{\text{TIME LO}}$, $\overline{\text{TIME HI}}$, $\overline{\text{EL LO}}$, $\overline{\text{EL HI}}$, $\overline{\text{AZ LO}}$, $\overline{\text{AZ HI}}$, $\overline{\text{SYNC}}$, $\overline{\text{MONTH}}$) and stored in latches. U3 and U4 are Hex D-type flip-flops used to latch the DVIP data. The digital data is converted by a digital-to-analog converter (u5) into an analog presentation of the radar video for scope monitoring. U28 is an operational amplifier which converts the current output of U5 into a voltage output. Q1 is a transistor driver used to drive the scope monitor output.

2.4.5.2 U1 and U2 are octal D-type latches used to latch the auxiliary data bytes for front panel monitoring. Only one word (two bytes) can be monitored at a time on the four 7-segment displays. Selection of the word to be monitored is done by the data selector/multiplexers U7 and U6. The select lines to the selectors come from the encoded three-wire signals of the front panel MONITOR switch. Thus, only one pair of data strobes ($\overline{\text{MONTH}}$ and $\overline{\text{DAY}}$, $\overline{\text{SYNC}}$ and $\overline{\text{STATUS}}$, $\overline{\text{TIME HI}}$ and $\overline{\text{TIME LO}}$, $\overline{\text{EL HI}}$ and $\overline{\text{EL LO}}$, $\overline{\text{AZ HI}}$ and $\overline{\text{AZ LO}}$) is allowed to go through to latch U1 and U2.

2.4.5.3 During the sync byte time, the $\overline{\text{SYNC}}$ strobe is also used to clear U3 and U4 so that the DVIP data at the monitor output will be zero during the auxiliary data time.

2.4.5.4 The outputs of U2 represent the most significant byte (HIGH BYTE), and the output of U1 represent the least significant byte (LOW BYTE) of the displayed word. These outputs are used by the display mounting board No. 1.

2.4.5.5 U13 is the single chip clock/calendar. Its time base is derived from the 3.579 MHz crystal oscillator and the clock divider U9, which divides it to 60 Hz.

2.4.5.6 The 7-segment outputs of U13 are open-drain outputs so they require pull-down resistors (100k) to convert them to voltage level outputs. U14, U15, U16 and U18 are 7 segment-to-BCD converters which convert the clock outputs to four digit BCD representation. U16 decodes the 10s digit of hours and days; U15 the units digit; U14 the 10s digit of minutes or months; U18 the units digit. The clock is preselected and wired to display a 24-hours clock.

2.4.5.7 Since the clock chip does not multiplex its outputs between data and time information, a 555 timer chip (U17) is used to externally multiplex the clock outputs. It is set up at approximately 3 KHz, determined by R42, R43 and C40. It will output approximately a 7 μs pulse for every 300 μs. These pulses will clock a D flip-flop (U8A) in a divide-by-2 mode so that its Q output will select calendar or time information alternately from the clock chip. A HIGH from Q will force output of OR gate U12A HIGH, thus selecting calendar output from the clock while a LOW at Q will select time, provided that the other input to U12A is LOW.

2.4.5.8 In order to be able to retrieve the DATA and TIME information at any time, two sets of latches are used to store this information. U26 and U24 are used to store HOUR and MINS, respectively, while U27 and U25 are used to store the DAY and MONTH information. The inputs to U24 and U25 are wired together as are U26 and U27. When the Q output of U8A is high, calendar is selected, and U11B is inhibited so the clock from U17 cannot go through. On the other hand, Q of U8A is LOW, so U11A is enabled; and the clock from U17 can then latch the data information from the decoders to the D-type latches U25 and U27. When Q output of U8A goes LOW at the next stage, the reverse will happen and the time information will be latched into U24 and U26.

2.4.5.9 Setting of time and date can be done through the front panel switches. A four CLOCK CONTROL position rotary switch on the front panel controls the mode of the clock chip. This is done by encoding the switch positions with a pair of signals (S1 and S2). The encoded switch positions are then decoded by a BCD-to-decimal decoder U10. Only 3 of the 10 outputs are used on U10, and only one will be HIGH at one time. The 1 and 3 outputs are wired-OR together through diodes CR5 and CR6 and pulled to ground with R7. They correspond to the TIME and SEC/HOLD switch positions. At these switch positions, U8A will be reset by the junction of the two outputs above. This will inhibit the clocking of the MONTH/DAY latches while enabling HOUR/MIN latches to be updated. In addition, in the SEC/HOLD position, the 3 outputs will select the clock chip to put out minute-second information to the outputs. The 2 output corresponds to the DATE position. At this position, it will set U8A to disable the clocking of HOUR/MIN latches while enabling the MONTH/DAY latches. At the same time it also selects the clock mode to display calendar information through the OR gate U12A.

2.4.5.10 The clock chip is powered by the 12V bus and a back up battery supply through redundant diodes CR9 and CR10. The battery voltage (nominal 10.8V) is being monitored continuously at the negative input to the comparator U29. A reference voltage of 6.2 V is set up at the noninverting input through R41 and CR11. Since a voltage divider (R15 and R40) is implemented at the inverting inputs if the battery voltage drops below 9.1 volts $\left(6.2\ V \times \frac{R15 + R40}{R40}\right)$ the noninverting input becomes more positive than the inverting input, and the output of U29 will go HIGH to set flip-flop U8B. The HIGH output at Q will then enable the invert control to the 7 segment-to-BCD decoders. The inverted 7 segment information is read as invalid input by the decoders, whose outputs are tri-state. U20A and U20B decode all HIGH (tri-state actually) conditions at the 1st and 3rd digits; because of the exclusive OR gate U19 and U21, the inputs to the latches are the 1st and the 3rd digit positions which are all LOWs. On the other hand, the outputs from U18 and U15 go directly to the latches and all will look like HIGHs. The low battery condition is then indicated by an "OFOF" displayed on the 7-segment displays.

2.4.5.11 The clock chip itself has a power failure indicator by flashing its on segments simultaneously at 1 Hz rate. Since the clock has back-up battery supply, this indication will occur if power failure causes the battery to drop below 9.1V or if the clock display board has been unplugged temporarily. In either case, when power resumes, the display will be flashing between OFOF (low battery indication) and 8888 (blanking displayed inverted by INCOT of the 7-segment to BCD converters) at a 1 Hz rate.

2.4.5.12 Note that power failure indication is different from the low battery voltage indication. Both conditions can be cleared by setting the time and day.

2.4.6 DE Transmitter CCA N1A2A8. (See figure 10-28)

2.4.6.1 The DATA READY signal is provided by the radar for clocking the DVIP data onto the data bus. Its timing is shown in figure 2-17. [Since clocking in the negative-going transition is preferred by the specification (bit center time).] Besides clocking parallel DVIP data in, it is used to clock the retriggerable monostable multivibrator U20A at the inverted input 1A. The time constant of U20A is determined by R40 and C32 (about 18 μs). Since the DATA READY signal has a normal rate of 150 kHz (data is updated at 6.7 μsec intervals), the output of U20A at 1Q will remain low during DVIP data time of 450 km (or 230) plus 18 μsec. During this time, the auxiliary data byte counter U15 and 11-bit counter U13 are both disabled and reset to zero. The output of U17B, which decodes the 11th bit, is HIGH; and only the DATA READY strobe can clock the shift registers through U18C.

2.4.6.2 U20B is another section of the multivibrator mentioned above. It is used to generate a narrow pulse (about 60 ns) for every negative transition in the DATA READY signal. The negative pulse at $\overline{2Q}$ output is used to clear the asynchronous clock divider U22 while at the same time the D flip-flop U21A will be clocked HIGH during the positive transition of the negative pulse to enable U18A.

2.4.6.3 As soon as the clear pulse is removed from U22, it will begin its counting on the next rising edge of the crystal clock. After four counts (about .28 μs), Q2 will be HIGH, and it will continue to clock at the rate of 1.79 MHz. This first rising edge of Q2 following each trailing edge of the DATA READY is used to strobe the DVIP data onto the data bus at the bit-center time through the NAND gate U18A, which is being enabled by 1Q of U21A. As soon as pin 3 of U18A goes low, it will reset U21A and disable itself at pin 2, causing its output to return to HIGH until the next DATA READY. This narrow negative-going pulse is long enough to load the 8-bit data into shift registers U6 and U7. The 1.79 MHz will then shift the data out in serial format at Q_H of U7.

2.4.6.4 During DVIP data time, since U15 is reset to zero, U16 will decode a low at pin 1, which is the strobe signal ($\overline{DAT}$) to enable the tri-state buffer for DVIP data at the input board.

2.4.6.5 After all the DVIP data has been transmitted to the IDE, there is a small dead time before the next radial of radar DVIP data. During this time, ready data will be HIGH. Thus, 18 μs after the last trailing edge of ready data, the retriggerable multivibrator U20A, will return to its normal state; and its $\overline{1Q}$ output will be HIGH. This will remove the reset signals from the 11-bit counter, U13, and AUX data byte counter, U15, and enable them to count. The 11-bit counter keeps track of the bits shifted out of each data byte (11-bit wide) because it is clocked by the same 1.79 MHz clock. U17B decodes the 11-bit count and resets U13 at the next rising edge of the 1.79 MHz clock. This negative pulse at pin 6 of U17B occurs for every auxiliary data byte and is used to provide a signal similar to DATA READY during auxiliary data time to latch the auxiliary data bytes.

2.4.6.6 There are 10 auxiliary data bytes to be transmitted: sync byte, azimuth high byte, azimuth low byte, elevation high byte, elevation low byte, time high byte, time low byte, status byte, month and day. The output of U13 and Q3 is used to clock the auxiliary data byte counter, whose output is decoded by the BCD-to-decimal decoder U16. U16 decodes the ninth of the ten auxiliary data bytes sequentially to give nine data strobes at its outputs to enable the appropriate data byte to be latched onto the data bus. The tenth auxiliary data byte (day) is decoded by U14A. U14B decodes the 11th byte count and resets U15, thus ending the auxiliary byte time.

2.4.6.7 Most of the data latches for the auxiliary byte to be enabled by the data strobes are in the input buffer board. The time and date latches come from the clock display board while the sync byte comes from the transmitter board itself.

2.4.6.8 U12 is the tri-state buffer for the sync byte and is preset to "F." U11E through H are buffers for the most significant 4 bits (not used) of the status byte and are preset to "0." Data are inverted through inverter buffer U10 before going into the shift register.

2.4.6.9 To generate the 11-bit pattern for each data byte, a start bit ("1") is inserted into H of U7. An odd parity bit is inserted at G of U6 by the parity-bit generator U5 (Sigma E), and as many stop bits ("0") as necessary are inserted at A through F of U6. U6 and U7 are cascaded together.

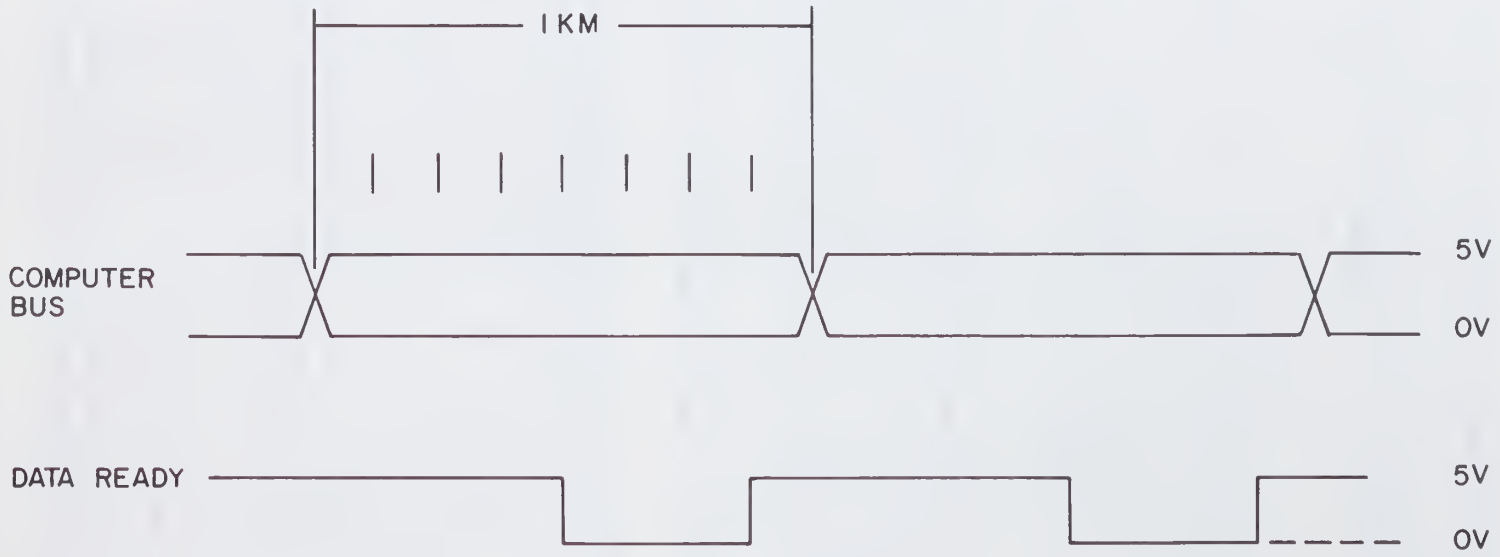


Figure 2-17. DVIP Data Timing Diagram

2.4.6.10 The serial bit stream is buffered by U11C into two open collector drivers, Q1 and Q2, which invert the signal. They, in turn, switch 8 pairs of push-pull driver amplifiers (contained in U1 through U4) in order to drive 8 separate output channels at 75 ohms impedance (OUT 1 through OUT 8).

2.4.6.11 Each output channel can be monitored throught the 8-to-1 multiplexer U8. Select lines A, B and C come from the front panel channel select switch to select which channel is to be monitored. U9 is a buffer amplifier which provides the monitor output to the receiver CCA.

2.4.7 Input Buffer CCA N1A2A9. (See figure 10-29)

2.4.7.1 Table 2-1 lists all radar signal outputs to the IDE and indicates whether the true state (logical "1") of the data bit is high or low. All outputs are applicable to both WSR-74 and WSR-57 radars with the exception of azimuth and elevation information. Azimuth and antenna elevation information for the WSR-57 are provided by three-wire synchro signals and the synchro reference signals.

2.4.7.2 U1, U2 and U18 through U37 are Hewlett-Packard HCPL-2531 optical isolators. (See detail "A" in schematic.) The radar outputs are all open collector outputs. An isolated 5 V supply in the IDE is used to pull up the open collectors through 300 ohm resistors and the input diode of the optical isolator. This arrangement completely isolates the IDE from the radar. The output of each optical isolator is also an open collector circuit requiring pull-up resistors (5.6K) connected to the IDEs +5 V supply.

2.4.7.3 A typical input isolator stage is shown in figure 2-18. The outputs of the optical isolators are all buffered by schmitt trigger inverters (U11-U17) to refine the logic levels of the signals. The DVIP data and several of the status signals are of opposite logic levels for the two types of radars. This is accommodated for by using inverting or noninverting buffers (U8 = 54LS244 for WSR-74 or U8 = 54LS240 for WSR-57) to gate the DVIP data onto the data bus while the difference in status signal polarities is accommodated for by preset jumper options (E5 through E16). Jumper positions for the two types of radar are shown in Paragraph 9.5.3 of Section 9).

2.4.7.4 The system trigger input is fed to voltage comparator U38, powered by the isolated 5V supply. The input is terminated in 75 ohms, (R4). R6 and R5 attenuate the level of the input signal, which can be between 0 and 40 V. R8 and R16 set the reference for the threshold of logic 1 state and is adjustable through R16. The conditioned system trigger signal is then optically isolated and buffered before it is used for the transmitter board and as a scope trigger. Q1 is an output driver for the external trigger at the front panel.

2.4.7.5 The system trigger signal at U12, pin 12 is also used to generate the azimuth inhibit and antenna elevation inhibit signals required by the WSR-74 radar. This is accomplished by the monostable multivibrator U4. The system trigger will trigger U4 to give 6 μs pulses (determined by R14 and C4) at its ouptut. The negative-going pulses at $\overline{Q}$ will be used to provide $\overline{\text{EL INH}}$ and $\overline{\text{AZ INHIBIT}}$ signals through the opto isolator U2 and buffer inverters U3A, B and C. The positive pulses at the Q output are used to latch the AZ and ANT ELEV information at U6, U9, U10 and U7.

2.4.7.6 U5, U8, U6, U9, U10 and U7 are tri-state buffers, whose outputs are all wired together. They are used to latch the related groups of signals (DVIP data, status information, azimuth BCDs and antenna elevation BCDs) onto the data bus. Since only four status bits are provided, they are latched onto the least significant bits of the data bus. Both the AZ BCD and elevation BCD information require two buffers, one for the hundreds and tens BCDs and the other for the units and tenths BCDs. To eliminate bus conflict, only one buffer would be enabled at a time. This is done by the data strobes provided by the transmitter board. These signals include $\overline{\text{DA}}$, $\overline{\text{ST}}$, $\overline{\text{AL}}$, $\overline{\text{AH}}$, $\overline{\text{EL}}$ and $\overline{\text{EH}}$.

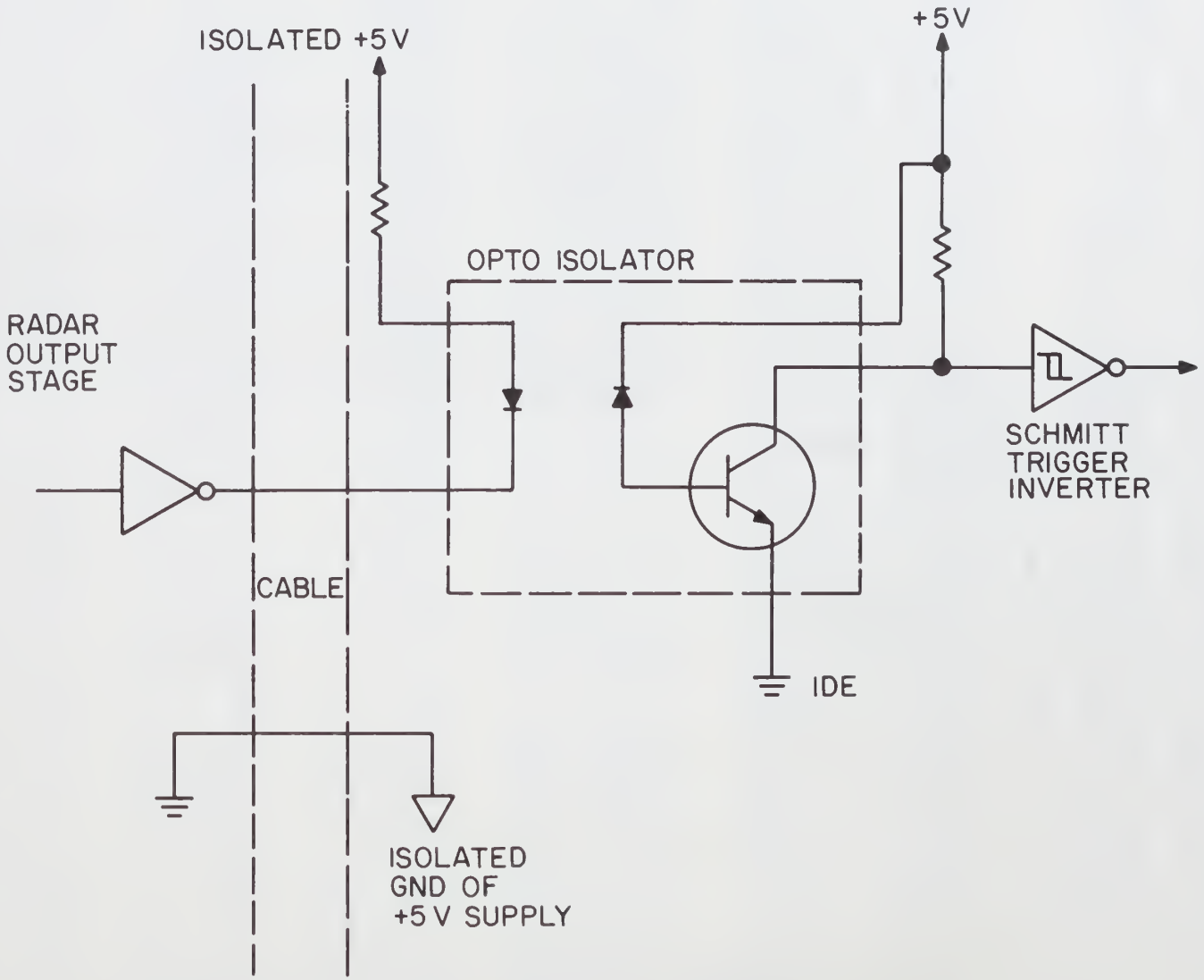


Figure 2-18. Typical Input Isolator Stage

SECTION 3. OPERATION

3.1 INTRODUCTION. — This section provides the procedures necessary to enable operating personnel to effectively operate the Isolation Distribution Equipment (IDE). Since proper setting of equipment controls and interpretation of the indicators is vital to proper operation, it is advised that the function of each control and indicator described in paragraph 3.2 be understood before continuing with the operating procedures given in paragraph 3.3. Paragraph 3.4 gives procedures for setting the clock.

3.2 CONTROL AND INDICATORS. — All operator controls and indicators for the IDE are described in table 3-1 and illustrated in figure 3-1.

3.3 OPERATING PROCEDURES.

3.3.1 Connections.

3.3.2 General. — The function of the IDE is to accept digital radar weather data, analog or digital radar azimuth and elevation data and radar status data; and to output this data, along with time and date data generated within the IDE, in serial form on eight output channels. An onboard decoder reconstructs the original data from any one of the eight output channels determined by the channel selection switch, so that the performance of the equipment may be checked at any time. A check of all the parameters (i.e., azimuth, etc.) on a single channel indicates the processing performance of the IDE. Since all eight channel outputs are indentical, only one parameter need be checked on each channel to demonstrate that all eight channels are functional.

3.3.2.1 Inputs.

a. Line cord plugged into 115V, 60 Hz outlet.

b. Coax cable connected to trigger input plug.

c. Multi-pin connector to WSR74 plug or multi-pin connector to WSR57 plug and to synchro plug.

3.3.2.2 Outputs. From one to eight output coax cables connected to output channel plugs 1 through 8.

3.3.3 Equipment Turn-On.

a. Note that the battery charger lamp is on.*

b. Set the power switch ON.

1. POWER indication lamp is on.*

2. Two indicating fuse lamps are off. (System will operate with one lamp on. Maintenance is required.)

3. All eight power supply voltage status indicator lamps are on. (System will operate if one of each type (i.e., +12V) indicator lamp is on. Maintenance is required.)

4. STATUS display — all four characters light with any digit.

---

*System may be functional without. Maintenance is required.

Table 3-1. IDE Controls and Indicators

INDEX NO.	CONTROL/INDICATOR	FUNCTION
1	POWER ON/OFF switch	Applies 115V, 60 Hz power to the power supplies.
2	POWER lamp (amber)	Indicates 115V power is applied to the power supplies.
3	Indicating fuse 2	Lights amber when fuse to #2 power supply is blown.
4	Indicating fuse 1	Lights amber when fuse to #1 power supply is blown.
5	BATTERY CHARGER lamp (green)	Indicates battery charger is operating. Lights when IDE line cord is connected to 115V, 60 Hz outlet.
6, 7, 8, 9	POWER SUPPLY #2 output voltage indicators (green lamps)	Each lamp indicates the associated voltage is being applied to the circuits from power supply #1.
10, 11, 12, 13	POWER SUPPLY #1 output voltage indicators (green lamps)	Each lamp indicates the associated voltage is being applied to the circuits from power supply #1.
14	CHANNEL MONITOR selector switch	Selects one of the eight output channels for decoding and display on the STATUS indicator.
15	CLOCK CONTROL selector switch	Used to set clock functions (seconds, minutes, hours, day and month).
16	STATUS SELECT selector switch	Selects any of the five status functions (decoded from the selected output channel) and routes it to the STATUS display.
17	SLOW/SET pushbutton	Used in setting the clock functions as a fine (slow) control.
18	FAST/SET pushbutton	Used in setting the clock functions as a fine (slow) control.
19	STATUS indicator	The indicator is a four-character numeric display. Decimal points and colons appear appropriately between the characters.

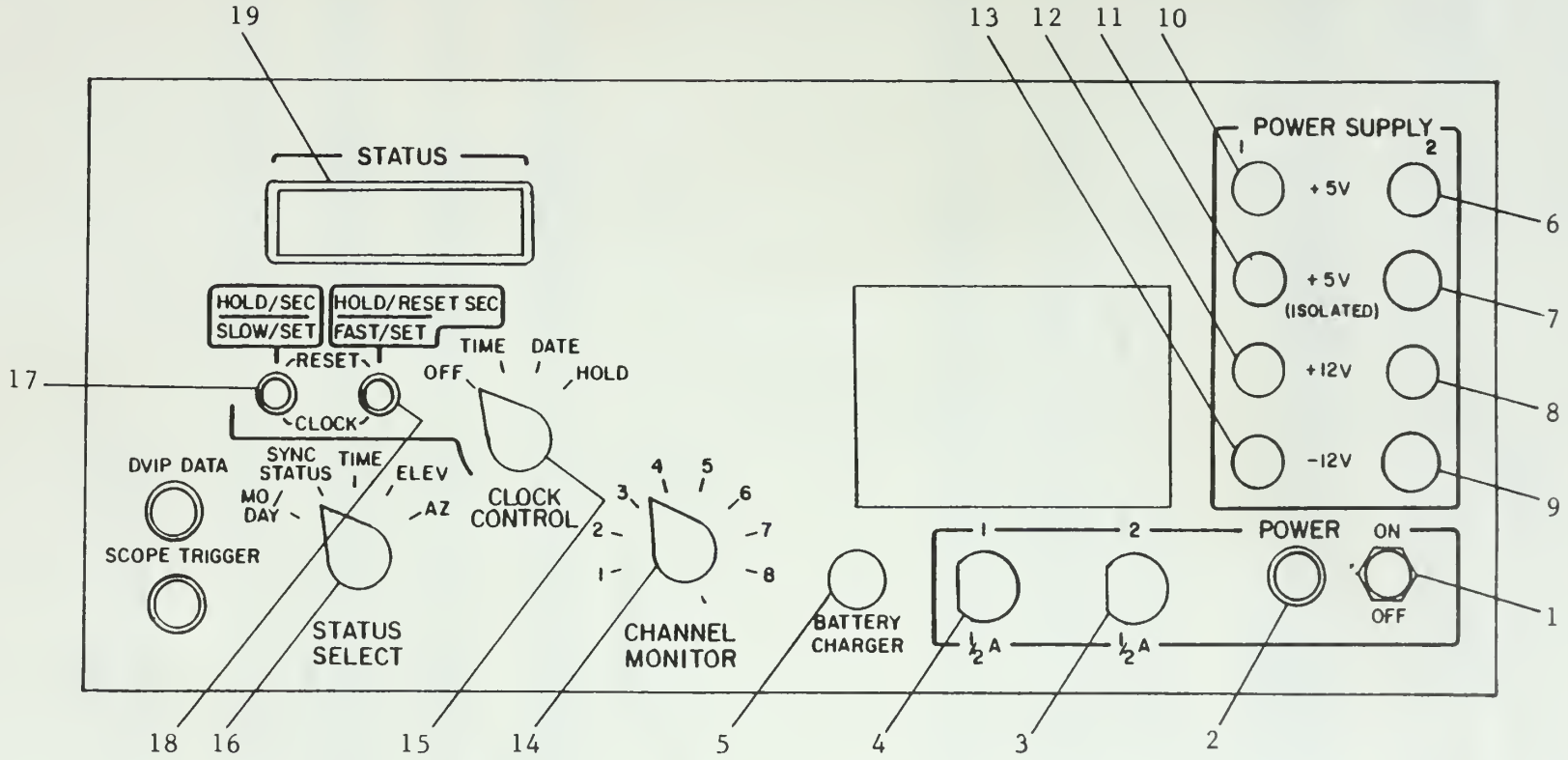


Figure 3-1. Isolation Distribution Equipment, Controls and Indicators

c. Clock Functions

1. Set the CLOCK CONTROL switch OFF.

2. Set the STATUS SELECT switch to TIME. If the STATUS display is flashing 0000, 0F0F, then the time, data and second functions must be set. If the incorrect time is displayed, the time and second functions must be set. If the correct time is displayed, continue to step 3.

3. Set the STATUS SELECT switch to MO/DY. If the incorrect month (left two characters) or incorrect day (right two characters) appears, the MO/DY functions must be set. If the correct month number appears in the left two characters and the correct day number appears in the right two characters, continue to step 'd' below.

d. Processing Checks

1. Set the STATUS SELECT switch to AZ. A steady, increasing or decreasing four digits number (between 000.0 and 359.9) will appear, with the decimal point in front of the right most digit.

2. Set the STATUS SELECT switch to ELEV. A steady or changing four-digit number (from 350.0 to 065.0) will appear, with the decimal point in front of the last digit.

3. Set the STATUS SELECT switch to SYNC STATUS. The left two digits are always F F. The right center digit is always 0. The last digit may be any number from 0 to 9 or any letter from A to F.

3.3.4 Clock Set.

3.3.4.1 Time Set.

a. Set the STATUS SELECT switch to TIME.

b. Set the CLOCK CONTROL switch to HOLD.

c. Press the HOLD/RESET SEC button until a local time standard just reaches 00 seconds (start a new minute) and immediately release the button. This synchronizes the IDE clock's seconds function with the local time standard.

d. Set the CLOCK CONTROL switch to TIME. The left two display digits indicate the hour based on a 24-hour day. The right two digits indicate the minutes.

e. Press the FAST/SET button to advance the hours to the correct hour of the day. Do not let the minute function pass the present minutes required, since the hour function will increase by one every time the minute function passes 59.

f. Press the SLOW/SET button to advance the minutes to the correct minute required.

3.3.4.2 Month Day Set.

a. Set the STATUS SELECT switch to MO/DY.

b. Set the CLOCK CONTROL switch to MO/DY.

c. Press the FAST/SET switch until the correct month number appears in the left two digits. Do not let the day function pass the present day required since the month function will increase one month every time the day function passes 28, 30, or 31.

d. Press the SLOW/SET button until the correct day number appears in the right two digits.

e. Set the CLOCK CONTROL switch OFF.

3.3.5 Miscellaneous. — The IDE clock has a battery backup feature which allows for a power failure for up to a maximum of two hours without losing the correct time or date. When power is reapplied, the correct time will be displayed when the STATUS SELECT switch is set to TIME. In the event of a power failure, it is not necessary to make any switch changes to the IDE. When power is restored, the IDE will automatically function correctly.

SECTION 4. STANDARDS AND TOLERANCES

4.1 INTRODUCTION. — This section provides a list of essential equipment parameters, the standard value assigned to each parameter, and the tolerances/limits imposed on each standard as shown below.

PARAMETER	PARAGRAPH REFERENCE	STANDARD	TOLERANCE/LIMIT
Ac line power		120 Vrms	110 - 130 Vrms
+12V supply	6.2	12.0V	10.70 - 11.90V
−12V supply	6.2	−12.0V	−10.70 - 11.90V
+5V supply	6.2	5.0V	4.75 - 5.25V
+5V isolated supply	6.2	5.0V	4.75 - 5.25V
Battery charger output (with no battery)	6.2	11.4V	11.0 - 14.0V
Digital clock Clock period	6.2	16.66667 ms	±0.16 μs
Transmit/receive clock	6.2	14.318182 MHz	±720 Hz
AZ INH/EL IHH pulse	6.2	6.0 μs	±0.1 μs

5.1 PERFORMANCE CHECKS. – See table 5-1.

5.2 OTHER MAINTENANCE TASKS. – See table 5-2.

Table 5-1. Performance Checks

PERFORMANCE CHECK	REFERENCE PARAGRAPH	
	STANDARDS & TOLERANCES	MAINTENANCE PROCEDURES
Power Supply Voltages STATUS display	4.1	6.2

Table 5-2. Other Maintenance Tasks

PERFORMANCE CHECK	REFERENCE PARAGRAPH	
	STANDARDS & TOLERANCES	MAINTENANCE PROCEDURES
Routine Inspection		6.3.1
Air Filter Cleaning and Inspection		6.3.2

SECTION 6. MAINTENANCE PROCEDURES

6.1 GENERAL. — The preventive maintenance procedures contained in this section should be used with the information provided in Sections 4 and 5. The first step in testing the equipment is an inspection of the equipment with power off. Whether or not all or a portion of the trouble may be found in this manner, it is always a good practice to make visual inspection and basic continuity checks on equipment whose condition is unknown. These are the major elements of inspection.

(1) Electrical connection.

(2) Mechanical joints and linkages.

(3) Unauthorized or nonstandard repairs or modifications.

(4) Damaged parts. Check for corrosion, breakage, burning, etc.

(5) Cleanliness and finish.

The second step is performance testing and the final step is adjustments. Troubleshooting information is contained in Section 7. Performance test procedures in this section provide data which is representative of a correctly operating system. Indications obtained from the equipment under test are compared with the corresponding indications contained in this section to evaluate the equipment and to assist in troubleshooting. Maintenance records should be kept and as much data as possible recorded to assist in future repairs. List abnormal indications and describe what was done to correct the fault. Records should include actual measurements taken before and after a repair so that a work history is accumulated. This practice will aid in finding potential troubles before they start interferring with the performance of the equipment.

6.2 PERFORMANCE TESTS. — The IDE makes use of status indicators and built-in-test equipment (BITE) to facilitate performance testing. Performance tests for the IDE are given in table 6-1. These tests are performed with the IDE connected in normal system configuration.

6.3 OTHER MAINTENANCE TASK PROCEDURES. — The following paragraphs describe how to perform the maintenance checks listed in table 5-2.

6.3.1 Routine Inspection. — Perform the following procedure for routine inspection.

a. Check wiring for kinked, frayed, loose, or burned wires.

b. Ensure cable connectors are free from corrosion and are properly secured.

c. Check components for evidence of overheating, breakage, corrosion, or loose connections.

d. Check capacitors and transformers for leaks, bulges, or loose connections.

e. Inspect switch contacts for pits and arcing.

f. Ensure that all circuit card assemblies are firmly sealed in mating connections.

Table 6-1. Isolation Distribution Equipment Performance Tests

STEP	PROCEDURE	POINT OF MEASUREMENT		PERFORMANCE STANDARD
		INDICATOR/TEST POINT	LOCATED ON	
1	Connect the IDE to a 115 VAC, 60 Hz outlet.	BATTERY CHARGER lamp	Front panel	Lit
2	Set POWER ON/OFF switch to ON.	POWER indicator	Front panel	Lit
3	Set POWER ON/OFF switch to OFF. Remove fuse from POWER 1 fuseholder and reinstall the fuseholder with blown fuse.	POWER 1 fuseholder	Front Panel	N/A
4	Set POWER ON/OFF switch to ON.	POWER 1 fuseholder	Front panel	Lit
5	Set POWER ON/OFF switch to OFF. Remove fuse from POWER 2 fuseholder and reinstall the fuseholder with blown fuse.	POWER 1/POWER 2 fuseholders	Front panel	N/A
6	Set POWER ON/OFF switch to ON.	POWER 2 fuseholder	Front panel	Lit
7	Set POWER ON/OFF switch to OFF. Reinstall good fuse in POWER 1 fuseholder. Disable power supply No. 2 by removing the 1/2A fuse from POWER 2 fuseholder.	POWER 1/POWER 2 fuseholders	Front panel	N/A
8	Set POWER ON/OFF switch to ON.		Front panel	N/A
9	Measure the output voltages of power supply No. 1 as indicated below. Connect the DVM between the test points indicated. Refer to figure 10-16 for location of test points on the power supply No. 1 CCA.			
	−12V supply	TP3(+) and TP1(−)	Power supply No. 1 CCA	−10.70V to −11.90V
	+12V supply	TP4(+) and TP1(−)	Power supply No. 1 CCA	+10.70V to +11.90V
	+5V supply	TP2(+) and TP1(−)	Power supply No. 1 CCA	+4.75V to +5.25V
	Isolated +5V supply	TP5(+) and TP7(−)	Power supply No. 1 CCA	+4.75V to +5.25V

Table 6-1. Isolation Distribution Equipment Performance Tests (Continued)

STEP	PROCEDURE	POINT OF MEASUREMENT		PERFORMANCE STANDARD
		INDICATOR/TEST POINT	LOCATED ON	
10	Set POWER ON/OFF switch to OFF. Reinstall fuse in POWER 2 fuseholder. Disable power supply No. 1 by removing the 1/2A fuse from POWER 2 fuseholder.	POWER 1/POWER 2 fuseholders	Front panel	N/A
11	Set POWER ON/OFF switch to ON.		Front panel	N/A
12	Measure the output voltages of power supply No. 2 as indicated below. Connect the DVM between the test points indicated. Refer to figure 10-16 for location of test points on the power supply No. 2 CCA.			
	−12V supply	TP3(+) and TP1(−)	Power supply No. 2 CCA	−10.70V to −11.90V
	+12V supply	TP4(+) and TP1(−)	Power supply No. 2 CCA	+10.70V to +11.90V
	+5V supply	TP2(+) and TP1(−)	Power supply No. 2 CCA	+4.75V to +5.25V
	Isolated +5V supply	TP5(+) and TP1(−)	Power supply No. 2 CCA	+4.75V to +5.25V
13	Set POWER ON/OFF switch to OFF. Reinstall fuse in POWER 1 fuseholder.		Front panel	N/A
14	Set the POWER ON/OFF switch to ON.	POWER SUPPLY 1 and 2 −12V lamps	Front panel	Lit
		POWER SUPPLY 1 and 2 +12V lamps	Front panel	Lit
		POWER SUPPLY 1 and 2 +5V lamps	Front panel	Lit
		POWER SUPPLY 1 and 2 ISOLATED +5V lamps	Front panel	Lit

Table 6-1. Isolation Distribution Equipment Performance Tests (Continued)

STEP	PROCEDURE	POINT OF MEASUREMENT		PERFORMANCE STANDARD
		INDICATOR/TEST POINT	LOCATED ON	
15	Set STATUS SELECT switch and CLOCK CONTROL switch to TIME. Depress the FAST/SET pushbutton.	STATUS display	Front panel	All seven segments in all characters of STATUS display illuminate and indicate correct time.
16	Set STATUS SELECT switch to MO/DAY and CLOCK CONTROL switch to DATE.	STATUS display	Front panel	Correct month and day indicated.
17	Set STATUS SELECT switch to AZ.	STATUS display	Front panel	A steady, increasing or decreasing four-digit number (between 000.0 and 359.9) will appear with the decimal point in front of the right-most digit.
18	Set STATUS SELECT switch to ELEV.	STATUS display	Front panel	A steady or changing four-digit number (from 350.0 to 060.0) will appear, with the decimal point in front of the right-most digit.
19	Set STATUS SELECT switch to SYNC STATUS.	STATUS display	Front panel	The left two digits of the display should be FF, the right-center digit 0, and the right-most digit may be any number from 0 to 9 or any letter from A to F

g. Visually inspect AC power cords, plugs, and connectors to ensure that they free of cracks, cuts, loose connections, and safety hazards.

h. Visually check all coaxial cables for loose connections and damage.

6.3.2 Air Filter Cleaning and Inspection.

a. Open the panel to the card rack assembly to gain access to the air filter.

b. Using a straight slot screwdriver, remove filter clamps on backside of panel.

c. Lift out filter.

d. Hold filter in front of bright light and observe whether light is visible. If not visible, replace with a new filter. Otherwise replace old filter.

e. Using a straight slot screwdriver, reinstall filter clamps.

f. Close panel of the card rack assembly.

6.4 SPECIAL MAINTENANCE PROCEDURES. — No special maintenance procedures are required.

SECTION 7. CORRECTIVE MAINTENANCE

7.1 INTRODUCTION. — This section contains the information necessary to perform corrective maintenance and overhaul procedures. Table 7-1 provides a listing of test equipment required to perform the procedures provided herein. Table 7-2 contains the symptoms and index to troubleshooting. This section should be used in conjunction with the schematics and diagrams in Section 10.

7.2 SEMICONDUCTOR DEVICES/INTEGRATED CIRCUITS PRECAUTIONS. — CAUTION:

Semiconductor devices are delicate. There are three principal abnormalities that are most harmful to semiconductors. These are (1) excessive voltage or current, (2) excessive temperature, and (3) excessive shock. Semiconductors are unusually susceptible to static discharges because of their low operating voltages and the construction of the semiconductor junction. The following are examples of various abnormalities encountered in practice, but it is important that personnel who work with semiconductors be proficient enough to realize the semiconductor's capabilities and limitations, so that they can do maintenance with confidence.

7.2.1 Static discharges can be avoided by eliminating all external connections to the circuit that can provide a ground path. Leads which have a high capacity to ground, such as AC power or antenna transmission lines and the elements of soldering irons, should not be touched to semiconductor circuits while the circuits are grounded. First discharge the lines and then connect them. The human body can also accumulate sufficient potential to discharge a damaging spark.

7.2.2 Capacitors connected in the circuit should not be touched with external leads and should not be connected or disconnected while they still retain a charge. But both capacitors and semiconductors can be damaged by discharging the capacitor through a direct shunt. The capacitor should be allowed to discharge normally through the circuit RC time constant or be discharged through an external bleeder. Nothing in a semiconductor circuit should be connected or disconnected with power applied.

7.2.3 Defective circuit components can provide excessive capacitive or resistive leakage currents that damage semiconductors either directly or because of bias changes that increase power consumption. For example, any coupling capacitor is capable of this if it should leak and provide abnormal forward bias to the following semiconductor.

7.2.4 Always use some form of heat sink (usually pliers) between the semiconductor body and the soldering iron. The tendency is to use irons of too high a wattage rating (stay below 50 watts). The use of soldering guns should be avoided. The best soldering tool is one with replaceable tips of various wattages plus the unsoldering devices and vacuum tools for removal of excess solder. Do not unsolder a component know to be bad if it can be cut loose from the circuit. Then, only the leads need unsoldering and this can be done quickly. If the leads are very short, cut the body of the component with side cutters.

7.2.5 Cutting semiconductor leads with a cutter causes an appreciable shock wave to be transmitted to the junction; this shock can cause rupture. The lead to be cut should be held with pliers between the body of the semiconductor and the place of cutting to absorb the shock. Similar damage may be caused if the transistor is dropped. Striking a transistor case in search of intermittents is poor practice. Another cause of mechanical damage is overtightening of stud-mounted semiconductors. The mount should be mechanically secure, but the electrical efficiency of the joint is a matter of cleanliness in the joining surfaces. Never strike a circuit board against the bench to shake off solder.

7.2.6 Ohmmeters used for continuity checks should never be used on the lowest range or on the highest. Only general warnings can be given in this instruction book; no ohmmeter should ever be used with semiconductors until its instruction book has been studied. An ohmmeter has doubtful value as a service tool for semiconductors out of the circuit. Use a transistor tester with at least the capability to test gain and capacitive leakage.

7.2.7 Apply operating voltage of incorrect polarity can ruin semiconductors. A simple way to ensure proper polarity is to take a spare diode and connect it to the circuit so that it will block the supply if it is connected in reverse. This diode can be tack-soldered to the circuit board input or the incoming lead from the power supply. The diode should, of course, be capable of handling the voltage and current requirements of the circuit plus the surges of the supply.

7.3 CIRCUIT BOARD COMPONENT REPLACEMENT. — Some of the circuit boards in the system have been coated with a polyurethane compound which prevents the formation of current leakage paths or fungus on the boards in high humidity environments. If it is necessary to replace a component, the coating must also be replaced. CE-1164 protective coating is compatible with the circuit board coating and is MIL-I-46058 approved. CE-1164 is available in aerosol cans from CONAP Incorporated, Olean, New York 14760.

a. Either of two methods may be used to remove the coating and expose the faulty component. The coating must be removed and replaced on both sides of the board and the leads of the new component should be clipped as close to the board as possible.

1. Using a soldering iron of approximately 50 watts, circle the component as closely as possible with the soldering iron tip. The coating will soften and partially evaporate. (It may be necessary to circle the component several times, following the same path each time.)

2. Use a sharp knife to peel the coating from around the component. Remove the coating so that a complete circle of board around the component is exposed.

b. Replace the faulty component, observing the semiconductor precautions.

NOTE

Wear rubber gloves and, at all times, handle only the edges of the board.

c. Dip and agitate the affected portion of the printed circuit board in a container of 1-1-1 trichloroethane (Dow Type VG) to remove any grease oily residue, or flux.

d. Using isopropyl alcohol conforming to TT-1-735 and stiff-bristled brush, scrub the repaired area.

e. Immerse or rinse the board in deionized or distilled water and agitate the board slightly to ensure complete coverage. Remove excess water.

NOTE

After cleaning, handle the board with cotton gloves for masking or with plastic gloves for coating. **Do not** touch the boards with your skin. If boards remain at room temperature longer than 2 hours before coating, steps **f** and **g** must be repeated to ensure that all moisture is driven from the boards.

f. Dry the board in an oven at 167°F (75°C) for at least 1 hour, preferably 1.5 hours.

g. Remove the board from the oven and let it stabilize to room temperature.

h. Use latex masking, available from Contronic Devices, Westminster, California 92683, to mask areas that are not to be coated, such as connectors and heat sinks.

i. Using the aerosol can of CE-1164, apply a liberal coat to the repaired area of both sides of the board, lapping the surrounding areas to ensure a good seal. Allow the coating to cure until it is tack-free, approximately 20 to 30 minutes, then spray on another coat. The coating will be tack-free in approximately 20 to 30 minutes and will cure in 24 hours at room temperature. Optimum physical and electrical properties require 5 to 7 days curing at room temperature. An alternate cure of 3 hours at 60°C plus 2 to 3 days at room temperature may also be used.

j. Remove latex masking.

k. Inspection may be assisted by use of an ultraviolet light which causes a dye in the coating to fluoresce. Assuming the board remains unsoiled at this step, coating touchup may be done without recleaning.

1. For cleaning tools and equipment and for removing uncured coating, CONAP S-8 solvent is recommended.

7.4 TEST EQUIPMENT. — All test equipment required for maintenance is listed in table 7-1.

7.5 TROUBLESHOOTING PROCEDURE FOR THE IDE.

7.5.1 Introduction. — This section gives a condensed procedure to troubleshoot any malfunctioning of the Isolation Distribution Equipment. In general, the front panel displays and monitor output provide sufficient indication of any malfunction that may occur. The following section will list these indications and provide guided procedures in troubleshooting the problem down to the board level. The philosophy is that if proper signals enter a board correctly, the outputs (response to the inputs) should be correct for a good working board. Otherwise, the board is at fault.

Table 7-1. Test Equipment Required

NOMENCLATURE	PART NO.	MANUFACTURER	FSCM
Oscilloscope	7704A	TEKTRONIX, INC.	80009
Dual Trace Amp	7A18	TEKTRONIX, INC.	80009
Dual Trace Amp	7A26	TEKTRONIX, INC.	80009
Time Base	7B80	TEKTRONIX, INC.	80009
Delay Time Base	7B85	TEKTRONIX, INC.	80009
Logic Analyzer	7D01	TEKTRONIX, INC.	80009
Probe, Passive	P610	TEKTRONIX, INC.	80009
Probe, DAP	P451	TEKTRONIX, INC.	80009
Multimeter	260	TEKTRONIX, INC.	80009

7.5.2 Symptoms. — A table with common failure symptoms and troubleshooting procedures is given in table 7-2. Even if a failure symptom is not listed in the table, troubleshooting can still be performed by starting with 7.5.2.1 and proceeding onward.

Table 7-2. Symptoms and Index to Troubleshooting

SYMPTOMS	PRELIMINARY INFERENCES	TROUBLESHOOTING PROCEDURES REFER TO:
Power on light does not light.	Fuse & Power Connections	
All indicators for LVPS 1(2) do not light up.	Power Supply Board 1(2)	
One or more indicators for LVPS 1(2) do not light up.	Power Supply Board 1(2)	
No DVIP data or noise at monitor output for all 8 channels.	Transmitter, Receiver, Clock Display	7.5.2.7, 7.5.2.5, 7.5.2.6
No DVIP data or noise at monitor output for one or more channels.	Transmitter	7.5.2.7
Burnout segments No display on 7-segments	Clock Display Display Mounting	7.5.2.6, Step i. 7.5.2.2
Erroneous display for all functions	Clock Display Receiver, Transmitter	7.5.2.7, 7.5.2.5 7.5.2.6, 7.5.2.2
Error time or date cannot set time or date	Clock Display Front Panel Switches	7.5.2.6, Step h. 7.5.2.6, Step i.
Error in Azimuth Display	*Input Buffer/+ Synchro Converter /+ Synchro Output	7.5.2.8, 7.5.2.3 7.5.2.4
Error in Elevation Display	*Input Buffer/+ Synchro Converter	7.5.2.8, 7.5.2.3 7.5.2.4
Error in Status Byte	Input Buffer Board	7.5.2.8
Battery cannot be fully charged (low battery) (indication for power loss less than 2 hrs)	Battery, Battery Charger	7.5.2.1

* For R541 IDE
\+ For R540 IDE

7.5.2.1 Battery Charger CCA N1A1A1.

a. Check ac input to transformer at the 2-terminal side.

b. Check output of transformer at TB1-6 and 7; output should be 12 V p-p ac.

c. Check output of regulator at TB1-3; it should be about 13V.

d. Unscrew wire going from the positive terminal of the battery to TB1-1. Measure current going into the battery. If current is about 6-10 ma, battery charger is good. Replace battery.

7.5.2.2 Display Mounting CCA N1A1A2/A3.

a. Select one of the status words to be displayed on the 7 segments.

b. Test inputs to the display mounting board. The inputs should be the same as the outputs of U1 and U2 of the clock display board when the particular status strobe is active (refer to 6.1.7). The following gives a correspondence between the outputs of the clock display board and the inputs to the display mounting board.

CLOCK DISPLAY BOARD	DISPLAY MOUNTING BOARD
P1-40	P1-59
38	61
36	63
34	57
48	47
46	49
44	51
42	45
56	35
54	37
52	39
50	33
59	23
57	25
55	27
53	21

7.5.2.3 Synchro Converter CCA N1A2A3/A4.

a. Turn power off. Unplug the synchro data connector from the IDE. Pull out azimuth synchro converter board (Slot XA4-1) or elevation synchro converter board (Slot XA3-1). Put extender into its place and plug the converter board onto the extender. Reconnect the synchro data connector. Turn power on.

b. Check power:

TP10 - 12.0V $\pm$ 0.6V

TP11 - -12.0V $\pm$ 0.6V

If voltages are out of spec, check power supplies.

c. Input a fixed azimuth or elevation angle to the IDE.

1. Verify inputs to the Scott-T transformer T1. P1-6, 2 and 4 are the inputs which are 90V; ac signals differ only in phases.

2. Verify the correct quadrant representation at AZS13/ELS13 (P1-49) and AZS12/ELS12 (P1-47) according to figure 2-14 in the theory of operation.

3. Verify the correct BCD representation of the AZ/EL angle at AZS0/ELS0 through AZS11/ELS11 (P1-23 through P1-45 odd pins). This angle is less than 90° (measured counterclockwise from quadrant boundaries). AZS11-ELS11 is the MSB of the tens degree, and AZS0/ELS0 is the LSB of the tenths degree.

7.5.2.4 Synchro Output CCA N1A2A5.

a. Turn power off. Unplug the synchro data connector from the IDE. Pull out synchro output board. Put extender board into place and plug back the synchro output board onto extender. Disconnect the synchro data connector. Turn power on.

b. Check Power:

TP4 = 12.0V ±0.6V

TP3 = 12.0V ±0.6V

TP1 = 5.0V ±0.25V

If voltages are out of specification, check power supplies. If problem is in azimuth section, go to Step c. If problem is in elevation, go to Step d.

c. Input a fixed azimuth angle to the IDE.

1. Verify the correct quadrant representation at AZS13 (P1-4) and AZS12 (P1-3) according to the convention described in the theory of operation.

2. Verify the correct BCD representation of the azimuth angle at AZS0 through AZS11 (P1-15, 16, 13, 14, 11, 12, 9, 10, 7, 8, 5, 6). This angle is less than 90° (measured counterclockwise from quadrant boundaries). AZS11 is the MSB of the tens degree and AZS0 is the LSB of the tenths degree.

3. Verify the BCD output angle at D0 through D7 (P1-17 through 31, odd pins) using $\overline{AH}$ and $\overline{AL}$ to qualify the data on the data bus. The angle should correspond to the input angle.

d. Input a fixed elevation angle to the IDE.

1. Verify the correct quadrant representation at ELS13 (P1-52) and ELS12 (P1-51) using the convention described in the theory of operation.

2. Verify the correct BCD representation of the elevation angle at ELS0 through ELS11 is 2.5 times the true angle. This angle is less than 90° (measured counterclockwise from quadrant boundaries). ELS11 is the MSB of the tens degree. ELS0 is the LSB of the tenths degree.

3. Verify the BCD output angle at D0 through D7 (P1-17 through 31, odd pins) using EH and EL to qualify the data on the bus. The angle should be 0.4 times the input angle, i.e., the true elevation.

7.5.2.5 Serial receiver CCA N1A2A6.

a. Turn power off. Pull out serial receiver board. Put extender board into slot and plug receiver board into extender. Turn power on.

b. Check power =

A6TP4 - GND

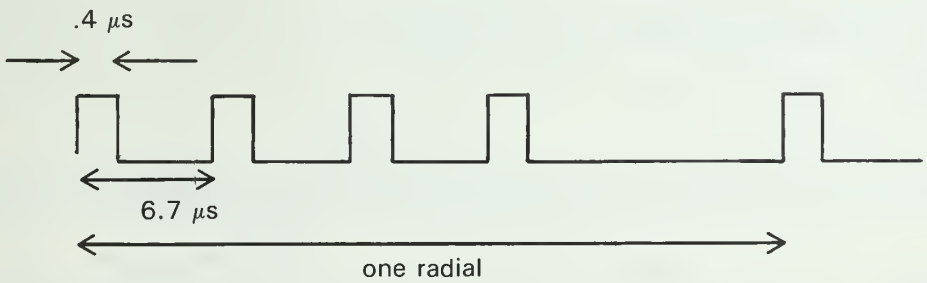
A6TP5 - +5 V ± 0.25 V

If voltage is out of specification, check power supplies.

c. Check Clock (TP1): 14.32 MHz

d. Check serial input at TP2 - should be the same as in 4.1.4 except inverted. If not, go to 4.1.4.

e. Check U1-9 for DATA valid strobe ($\overline{\text{DATA}}$).



f. Check U1 - Pin 5 for error indication. If $\overline{\text{ERROR}}$ strobe (negative going) occurs, randomly or consistently, receiver board is not functioning correctly (if transmitter board is checked out already).

g. Check data bus D0 through D7 using $\overline{\text{DATA}}$ as trigger. Verify that the bus output corresponds to the input DVIP data. (A fixed DVIP data may help.) An easier approach would be to use a logic analyzer.

h. Verify the data strobes generated at the receiver. Observe the relationships on page 7-8 (between each strobe and data bit D0).

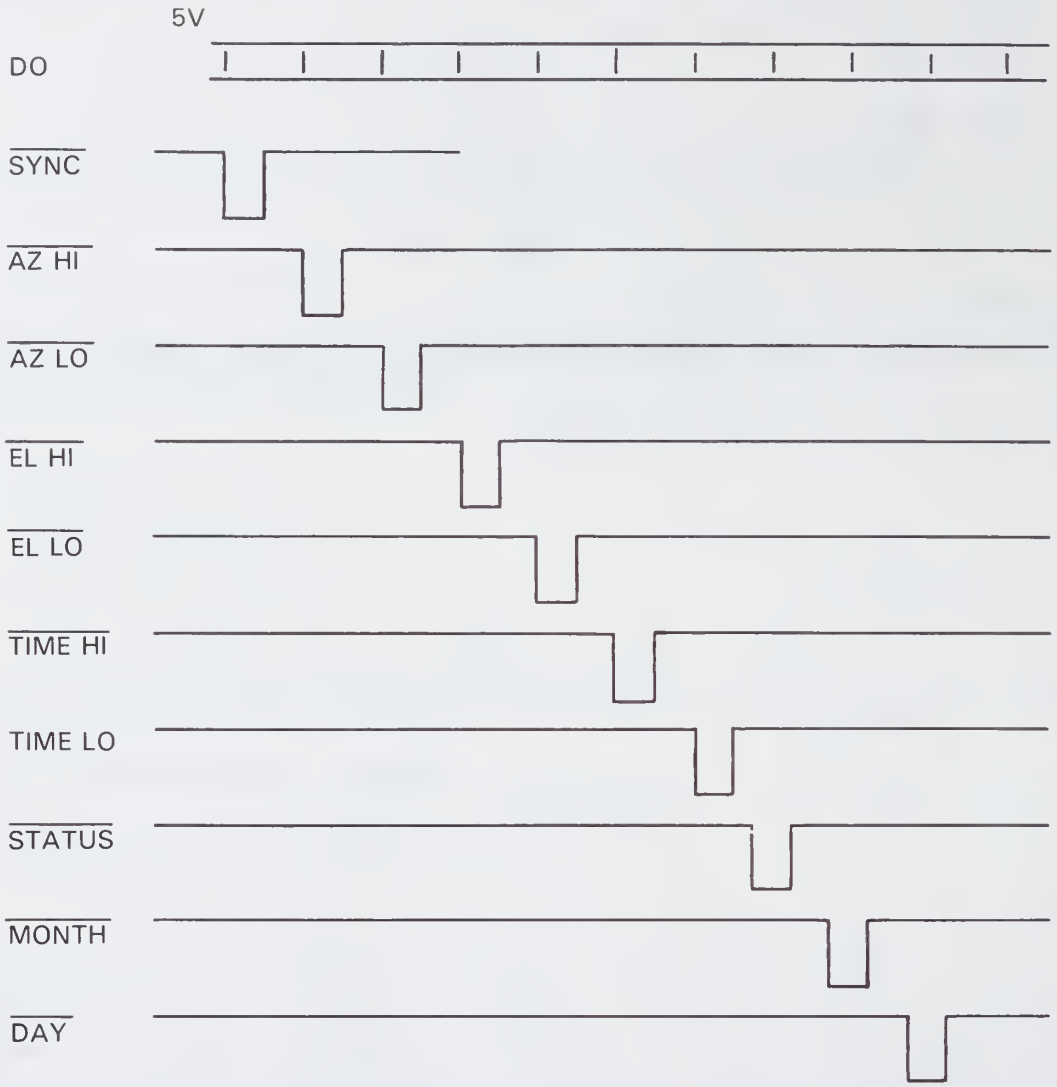
i. Verify other data bits for state transmissions (D1 through D7).

j. If result is different from above, receiver is at fault.

7.5.2.6 Clock and Display CCA N1A2A7.

a. Turn off power. Pull out cock and display board. Put extender board into slot and plug the card back into the extender. Turn on power.

DATA BIT TRANSITION



b. Check power: (using TP1 as GND)

A7TP2 - 5.0 V ± 0.25 V

A7TP5 - 12.0 V ± 0.6 V

A7TP3 - −12.0 V ± 0.6 V

If voltages are out of spec, check power supplies.

c. Check DVIP data bus (P1-18 through P1-32, even pins) in relation to $\overline{\text{DATA}}$ (P1-7) by triggering on the rising edge of $\overline{\text{DATA}}$. $\overline{\text{DATA}}$ should go low at every data byte transition and last for a duration of about .4 μs and should be high between radar dead times. If result is different, go to 7.5.2.3, step 8.

d. Monitor DVIP analog output at P1-41. A tedt level may be used as input to the IDE to verify the correct level output at P1-41. The LSB (D0) is worth about 20 mV, D1 about 40mV, D2 about 80mV, etc.

e. Verify data strobes ($\overline{\text{SYNC}}$, $\overline{\text{AZ HI}}$, $\overline{\text{AZ LO}}$, $\overline{\text{EL HI}}$, $\overline{\text{EL LO}}$, $\overline{\text{TIME HI}}$, $\overline{\text{TIME LO}}$, $\overline{\text{STATUS}}$, $\overline{\text{MONTH}}$, $\overline{\text{DAY}}$) as in procedure 5.1.8.

f. Check function select switch encoding by turning the switch to each individual position and verify the following levels on P1-33, 35, and 39.

	MO/DAY	STATUS	TIME	ELEVATION	AZIMUTH
Z0 (P1-33)	0 V	5 V	0 V	5 V	0 V
Z1 (P1-35)	0 V	5 V	5 V	0 V	0 V
Z2 (P1-39)	5 V	0 V	0 V	0 V	0 V

g. Verify that the output words at outputs of U1 and U2 correspond to the actual inputs. Data strobes going into U6 and U7 and the function selection switch should be used to interpret the data at U1 and U2.

h. Verify the control inputs to the clock chip.

1. U13 pin 24 should toggle every 300-450 μs with the clock control switch in the OFF position. Selecting TIME should go LO and DATE should go HI.

2. U13 pin 32 is normally LO unless in the HOLD position.

3. U13 pin 33 should go HI when SLOW SET is pushed.

4. U13 pin 34 should go HI when FAST SET is pushed.

i. Verify the time and date outputs of the clock. Monitor both the inputs and outputs to U22 using strobes $\overline{\text{TL}}$, $\overline{\text{MO}}$, $\overline{\text{TH}}$, $\overline{\text{DA}}$ to interpret the data.

j. Check voltage comparator: If voltage at U29 pin 3 is greater than pin 2, U29 and pin 7 should be LOW. Otherwise it should be HIGH.

k. Any discrepancy from the above means the clock board is bad.

7.5.2.7 Transmitter CCA N1A2A8.

a. Turn off power, pull out transmitter board, put extender board into the slot, and plug the transmitter onto the extender. Turn on power.

b. Check power to board (using TP1 as ground):

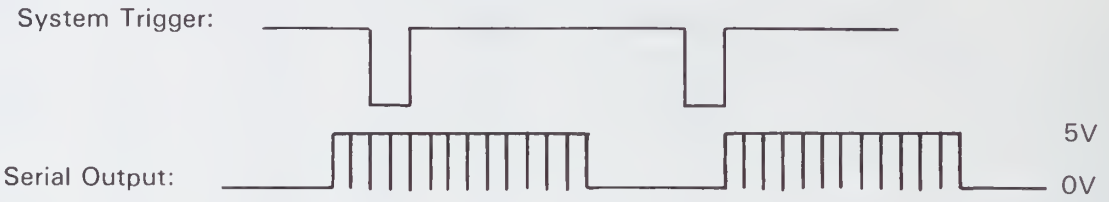
A8TP9 - 5.0 V $\pm$ 0.6V

A8TP3 - 12.0 V $\pm$ 0.6V

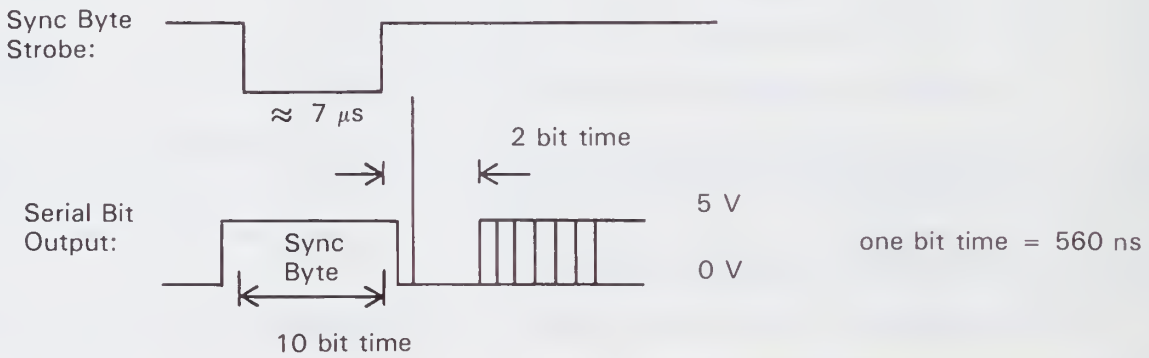
A8TP2 - 12.0 V $\pm$ 0.6 V

If voltages are out of specification, check power supplies.

c. Use a dual trace oscilloscope to monitor the data ready strobe (TP7) and data bits (D0 through D7) on P1-17 through P1-31 (odd pins). Use the system trigger as external trigger. Start with data bit D0 (P1-17) and observe that the trailing edge of DATA RDY occurs at the bit center of the data bit. Check other data bits to verify that the data bit transitions do not fall close to the trailing edge of the $\overline{\text{DATA RDY}}$. If bad, go to 7.5.2.1. Monitor the serial output at U9 - pin 6 (or at R33), using the system trigger as trigger, and observe the serial output. Select all 8 channels of the select switch.

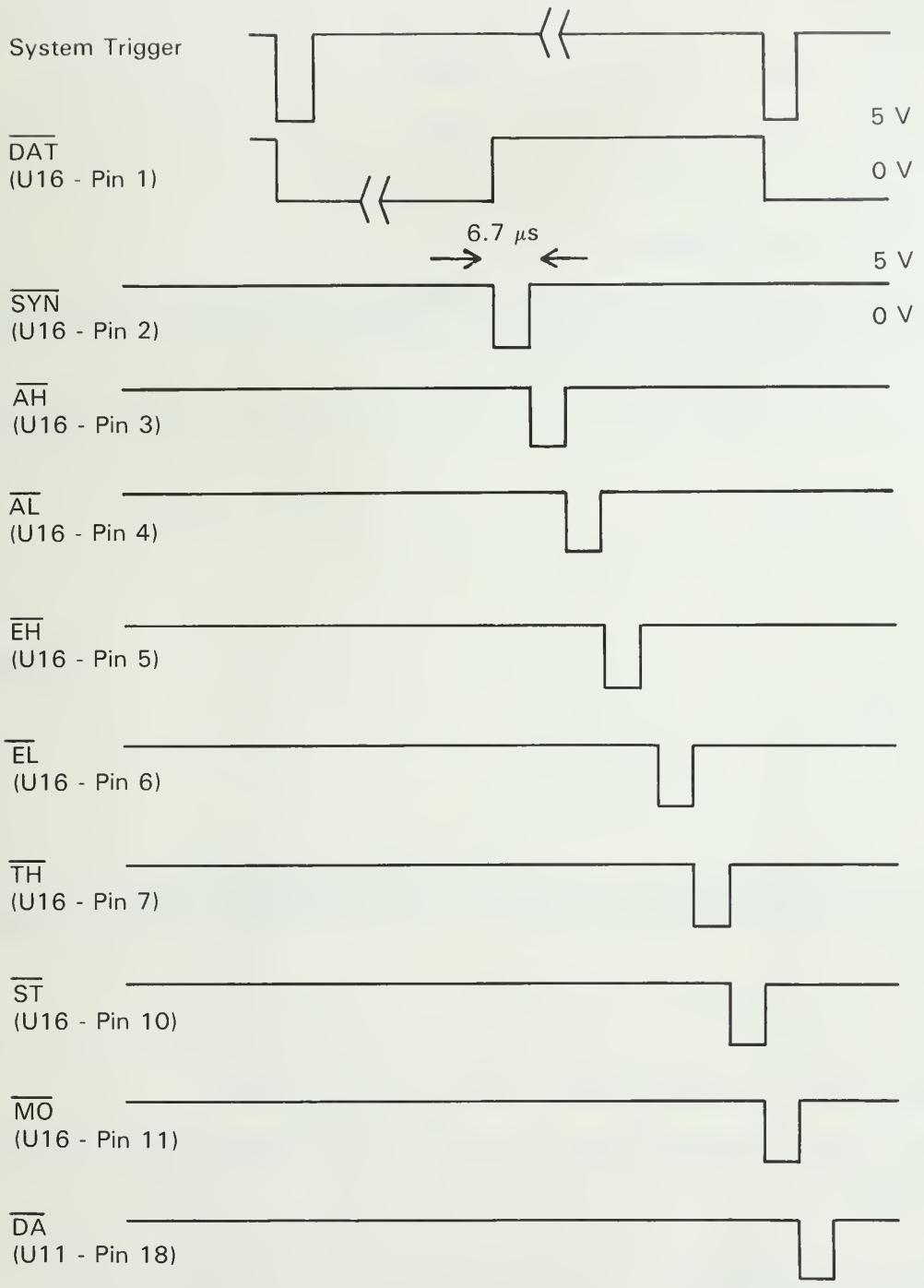


d. Now use the sync byte strobe (U16 - Pin 2) as trigger (negative edge); observe (oscilloscope horizontal, 2 μs/div.) the bit pattern:



Monitor the serial outputs at the BNC output channels. Verify also that the HIGH bit time and LOW bit time are about the same, i.e., 560 ns and no excessive rounding occurs at the transitions. (Make sure that the channels are terminated.)

e. Observe the relationships between the data strobes and auxiliary data strobes:



f. If results are different from the above, the transmitter board is at fault.

7.5.2.8 Input Buffer CCA N1A2A9.

a. Turn power off. Pull out input buffer board, put extender board into slot, and plug input buffer board onto extender. Turn power on.

b. Check power:

A9TP4 — 5.0 V ± 0.25 V (use TP6 as GND)

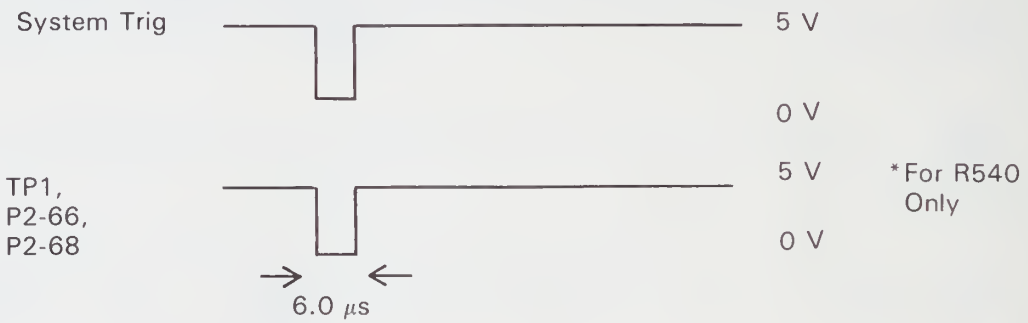
A9TP5 — 5.0 V ± 0.25 V (use TP7 as GND)

If voltages are out of specification, check power supplies.

c. Verify that the system trigger goes to A9P2-64.

d. Monitor TP2 (system trigger) using A9TP7 as GND for the oscilloscope probe. If trigger pulse appears steady, proceed to next section. Otherwise, adjust R16 to obtain a steady trigger pulse. Monitor TP3 using TP6 as GND; it should be similar to TP2.

e.* Monitor TP1 (TP6 as GND), P2-66 (TP7 as GND), P2-68 (TP7 as GND) with relation to the system trigger:



f. Use a dual-trace oscilloscope to monitor $\overline{\text{DATA RDY}}$ (U5-14) and $\overline{\text{DO}}$ (U8 - Pin 9) and verify that the trailing edge of $\overline{\text{DATA RDY}}$ occurs at the bit center of DO (DVIP data may be needed to see this). Check other data bits (D1 through D7) that their transitions do not fall into the trailing edge of the $\overline{\text{DATA RDY}}$.

g. Check the timing for $\overline{\text{DAT}}$ (P1-7) and $\overline{\text{ST}}$ (P1-37) as described in 4.1.5.

h. Using a fixed DVIP word (Test Pattern), verify that DVIP data bits are correctly getting through to U8 and ouptut to the edge connector. Check for correct polarities.

i. Using $\overline{\text{ST}}$ strobe for triggering, verify that the status bits at output of U5 correspond to the radar inputs, taking all data inversions into account. (Note: HCPL2531 and 54LS244 do not invert data 54LS240 inverts.)

j. For WSR-74, stop antenna movement and verify correct digital azimuth and elevation data is on inputs of A9U6, U7, U9 and U10. For example, an elevation of 9.3 degrees would yield a 10010011 on the D7-D0 input of U7.

k. Verify that these bits are then clocked onto the Data Bus at the correct time of $\overline{\text{EL HI}}$, $\overline{\text{EL LO}}$, $\overline{\text{AZ HI}}$ or $\overline{\text{AZLO}}$.

l. Any discrepancy from the above would lead to the conclusion of a faulty input buffer board.

ISOLATION DISTRIBUTION EQUIPMENT
SECTION 8. PARTS LIST

8.1 GENERAL.- This section contains a tabulation of descriptive data of all electrical and certain mechanical parts of the IDE (table 8-1). The tabulation is arranged in alpha-numeric order of reference designation. To best use the parts list, you should read the following information.

8.1.1 Reference Designation.- This column lists the reference designation of each component. All partial reference designation, such as C1, DS1, R1, etc., should be prefixed by preceding unit and assembly number, as applicable.

8.1.2 Indenture Letter.- This column lists the indenture letter of each component. This letter indicates the relationship of the component to its next higher assembly.

8.1.3 Name of Part and Description.- A brief electrical or mechanical description of each component is given in this column. Electrodynamics' part numbers for vendor items are listed as applicable.

8.1.4 Manufacturer's Code.- This column lists the manufacturer's federal code number as given in the Federal Supply Code for Manufacturers, Federal Cataloging Handbook H4-1. To find the manufacturer's name and address, locate this number in table 8-2, List of Manufacturers. If the component has a military part number, no manufacturer is listed.

8.1.5 JAN, MIL, or Manufacturer's Part Number.- This column gives the designation assigned to a component per JAN or MIL specifications or the number assigned to the component by the component manufacturer.

8.1.6 Notes.- This column is left blank for National Weather Service field use.

8.2 REFERENCE DESIGNATION ASSIGNMENT.- Reference designation assignment and marking of the equipment is according to the unit numbering method outlined in specification "ANSI Y32.16 - Reference Designations for Electrical and Electronics Parts and Equipments."

For example, in reference designation N1N2A101R1

N1 = Unit number
N2 = Assembly number
A101 = Subassembly number
R1 = Basic part

Subassemblies that are identical are prefixed with prefixes for each subassembly; i.e., N1N2A105/A106/A107.

Table 8-1. Parts List

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
	A	IDE FINAL ASSEMBLY	10236	1260020A1	
	B	FRONT PANEL & HOUSING ELECTRICAL ASSY.	10236	2260015A1	
	C	HOUSING ASSEMBLY	10236	3260049A1	
	D	HOUSING SUBASSEMBLY	10236	8050178A1	
	D	CONNECTOR PANEL ASSEMBLY	10236	8501293A1	
MP1	E	CLAMP, D, SUBMINIATURE	10236	7180150-2	
J1	E	CONNECTOR, SOCKET: D-type, subminiature	10236	7180147-4	
R1	E	RESISTOR, FIXED, COMPOSITION: 470 ohms ± 5%; 1 W; MIL-R-39008/3	81349	RCR32G470JS	
R2	E	Same as R1			
R3	E	Same as R1			
R4	E	Same as R1			
R5	E	Same as R1			
R6	E	Same as R1			
R7	E	Same as R1			
R8	E	Same as R1			
J2	E	CONNECTOR, BNC, RECEPTACLE (Electrodynamics 7180154-1)	74868	31-10	
J3	E	CONNECTOR, RECEPTACLE, 14 Pin	96906	MS3102A20-27P	
J4	E	CONNECTOR, RECEPTACLE, 55 Pin	96906	MS3112E22-55P	
J5	E	CONNECTOR, RECEPTACLE, 52 Pin	96906	MS3102A32-414P	
FL1	E	RFI FILTER (Electrodynamics 7140023-1)	05245	3EF2	
E1	E	SURGE PROTECTOR	10236	7030059-1	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
N1A1	C	FRONT PANEL ASSEMBLY	10236	3260044A1	
N1A2	D	CARD RACK ASSEMBLY	10236	8501292A1	
N1A3	D	CONTROL PANEL ASSEMBLY	10236	8501291A1	
J1	E	CONNECTOR, BNC, RECEPTACLE (Electrodynamics 7180154-1)	74868	31-10	
J2	E	Same as J1			
MP1	E	FUSEHOLDER (Electrodynamics 7180134-1)	71400	HKL	
MP2	E	Same as MP1			
DS1	E	LAMP, NEON (Electrodynamics 7230017-1)	53343	NE-2J	
DS2	E	LAMP, INCANDESCENT: 18 V (Electrodynamics 7230016-1)	71744	CM370	
DS3	E	Same as MP4			
DS4	E	Same as MP4			
DS5	E	Same as MP4			
DS6	E	Same as MP4			
MP3	E	CLAMP, D, SUBMINIATURE (Electrodynamics 7180150-2)	71787	DC-24661	
S1	E	SWITCH, PUSHBUTTON (Electrodynamics 7152050-1)	95146	MPA-103C	
S2	E	SWITCH, ROTARY: 4 pole, 5 position (Electrodynamics 7152051-2)	71950	PA-2013	
S3	E	SWITCH, ROTARY: 3 pole, 4 position (Electrodynamics 7152052-1)	71950	SA-209-3A-135 DEG	
S4	E	SWITCH, ROTARY: 3 pole, 8 position (Electrodynamics 7152051-1)	71950	PA-2009	
S5	E	SWITCH, TOGGLE	96906	MS90311-221	
J3	E	CONNECTOR, D, SUBMINIATURE (Electrodynamics 7180147-2)	71468	DD-50S	
DS7	E	LAMP, INCANDESCENT: 6 V (Electrodynamics 7230016-4)	71744	CM345	
FL1	E	LENS FILTER, RED	10236	8162017-3	
F1	E	FUSE: 250 V, 1/2A (Electrodynamics 7260011-15)	71400	MDL-1/2	
MP4	E	KNOB	96906	MS91528-1P2B	
MP5	E	LAMPHOLDER, NEON	96906	MS25257-2	
MP6	E	LAMPHOLDER, INCANDESCENT	96906	MS25256-4	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
R1	E	RESISTOR, FIXED, COMPOSITION: 39,000 ohms; ±5%; 1/2 W; MIL-R-39008/2	81349	RCR20G393JS	
N1A3A1	E	MOUNTING BRACKET SUBASSEMBLY	10236	8060370A1	
J1	F	CONNECTOR, CARD EDGE	10236	7180163-1	
MP1	F	CARD GUIDE	10236	8501042-1	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
N1N1	E	BATTERY CHARGER ASSEMBLY	10236	8501287A1	
BT1	F	BATTERY	10236	7060002-1	
E1	F	INSULATOR PAD, MICA	10236	8500699-1	
E2	F	WASHER, INSULATOR	10236	8141047-1	
E3	F	WASHER, INSULATOR	10236	8501049-1	
MP1	F	CLAMP (Electrodynamics 8062048-1)	06915	V-1006	
T1	F	TRANSFORMER (Electrodynamics 7160050-1)	70674	3-20706-000	
VR1	F	IC, VOLTAGE REGULATOR (Electrodynamics 7100370-1)	27014	LM117K	
N1A1A1	F	BATTERY CHARGER CCA	10236	4260079A1	
C1	G	CAPACITOR, FIXED, ELECTROLYTIC: tantalum; 470μF - 10%, +30%; 30 V; MIL-C-39018/3	81349	M39018/03-0629	
C2	G	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 0.1μF ±10%; 50 V; MIL-C-39014/1	81349	M39014/01-1473	
CR1	G	SEMICONDUCTOR DEVICE, DIODE: Voltage suppressor; MIL-S-19500/116F	81349	JAN1N4148	
CR2	G	Not Used			
CR3	G	SEMICONDUCTOR DEVICE, DIODE: 200 Peak Input Voltage; 1A maximum, MIL-S-19500/427B	81349	JAN1N5614	
CR4	G	Same as CR3			
CR5	G	Same as CR3			
CR6	G	Same as CR3			
MP1	G	END BARRIER (Electrodynamics 8240064-1)	33333	776-0001	
MP2	G	PRINTED WIRING BOARD	10236	6260079-1	
R1	G	RESISTOR, FIXED, COMPOSITION: 121 ohms ±1%; 1/10 W; MIL-R-55182/1	81349	RNC55H1211FS	
R2	G	RESISTOR, FIXED, COMPOSITION: 10 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G100JS	
R3	G	RESISTOR, FIXED, COMPOSITION: 100,000 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G104JS	
TB1	G	TERMINAL BLOCK: 7 Position (Electrodynamics 8240061-1)	33333	JB6-P101-01	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
	B	DISPLAY MOUNTING BOARD FINAL ASSEMBLY	10236	4260081A1	
N1A1A2	C	DISPLAY MOUNTING NO. 2 CCA	10236	4260078A1	
DS1	D	SEMICONDUCTOR DEVICE, DISPLAY: 7-segment display (Electrodynamics 7230023-1)	28480	HDSP-3531	
DS2	D	Same as DS1			
DS3	D	SEMICONDUCTOR DEVICE, LIGHT EMITTING DIODE: (Electrodynamics 7030057-1)	50579	LD464	
DS4	D	Same as DS1			
DS5	D	Same as DS1			
MP1	D	PRINTED WIRING BOARD	10236	6260078-1	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
N1A1A3	C	DISPLAY MOUNTING NO. 1 CCA	10236	4260077A1	
C1	D	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 0.1 μF ±10%; 50 V; MIL-C-39014/1	81349	M39014/01-1473	
C2	D	CAPACITOR, FIXED, ELECTROLYTIC: tantalum; 2.2 μF ±10%; 20 V; MIL-C-39003/1	81349	M39003/01-2283	
MP1	D	PRINTED WIRING BOARD (Electrodynamics 6260077-1)	10236	6260077-1	
R1	D	RESISTOR, FIXED, COMPOSITION: 240 ohm ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G241JS	
R2	D	Same as R1			
R3	D	Same as R1			
R4	D	Same as R1			
R5	D	Same as R1			
R6	D	Same as R1			
R7	D	Same as R1			
R8	D	Same as R1			
R9	D	Same as R1			
R10	D	Same as R1			
R11	D	Same as R1			
R12	D	Same as R1			
R13	D	Same as R1			
R14	D	Same as R1			
R15	D	Same as R1			
R16	D	Same as R1			
R17	D	Same as R1			
R18	D	Same as R1			
R19	D	Same as R1			
R20	D	Same as R1			
R21	D	Same as R1			
R22	D	Same as R1			
R23	D	Same as R1			
R24	D	Same as R1			
R25	D	Same as R1			
R26	D	Same as R1			
R27	D	Same as R1			
R28	D	Same as R1			
R29	D	Same as R1			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
R30	D	RESISTOR, FIXED, COMPOSITION: 180 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G181JS	
R31	D	Same as R1			
U1	D	IC, 7-SEGMENT DECODER/DRIVER (Electrodynamics 7100444-1)	07263	9370	
U2	D	Same as U1			
U3	D	Same as U1			
U4	D	Same as U1			
XU1	D	CONNECTOR, IC SOCKET: 16 pins; low profile (Electrodynamics 7180132-3)	00779	641262-1	
XU2	D	Same as XU1			
XU3	D	Same as XU1			
XU4	D	Same as XU1			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
N1A2A1/A2	B	D.E. POWER SUPPLY NO. 1 CCA	10236	4260067A1	
C1	C	CAPACITOR, FIXED, ELECTROLYTIC: tantalum; 2.2 μF ±10%; 20 V; MIL-C-39003/1	81349	M3900/01-2283	
C2	C	Same as C1			
C3	C	CAPACITOR, FIXED, ELECTROLYTIC: tantalum; 2.2 μF ±10%; 15 V; MIL-C-39003/1	81349	M39003/01-2271	
C4	C	Same as C3			
C5	C	CAPACITOR, FIXED, ELECTROLYTIC: tantalum; 4.7 μF ±10%; 10 V; MIL-C-39003/1	81349	M39003/01-2254	
C6	C	CAPACITOR, FIXED, ELECTROLYTIC: aluminum; 470 μF -10%, +30%; 10 V; MIL-C-39018/1	81349	M39018/01-0611	
C7	C	CAPACITOR, FIXED, MICA DIELECTRIC: 750 μF ±5%; 500 V; MIL-C-39001/5	81349	CMR06F751JPDM	
C8	C	CAPACITOR, FIXED, ELECTROLYTIC: tantalum; 47 μF ±20%; 6 V; MIL-C-39003/1	81349	M39003/01-2245	
C9	C	CAPACITOR, FIXED, ELECTROYLTIC: tantalum; 100 μF, ±10%; 20 V; MIL-C-39003/1	81349	M39003/01-2301	
C10	C	Same as C9			
C11	C	CAPACITOR, FIXED, MICA DIELECTRIC: 2200 pF ±5%; 500 V; MIL-C-39001/5	81349	CMR06F222JPDM	
C12	C	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 1.0 μF ±10%; 50 V; MIL-C-39014/1	81349	M39014/02-1407	
C13	C	CAPACITOR, FIXED, CERAMIC DIELECTRIC: .01 μF ±10%; 100 V; MIL-C-39014/1	81349	M39014/01-1455	
C14	C	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 0.1 μF ±10%; 50 V; MIL-C-39014/1	81349	M39014/01-1473	
C15	C	Same as C14			
C16	C	Same as C5			
C17	C	CAPACITOR, FIXED, ELECTROLYTIC: aluminum; 2200 μF -10%, +30%; 10 V; MIL-C-39018/1	81349	M39018/03-0613	
C18	C	CAPACITOR, FIXED, ELECTROLYTIC: aluminum; 10 μF -10%, +30%; 250 V; MIL-C-39018/1	81349	M39018/01-1171	
C19	C	Same as C14			
C20	C	CAPACITOR, FIXED, MICA DIELECTRIC: 510 pF ±5%; 500 V; MIL-C-39001/5	81349	CMR06F511JPDM	
C21	C	CAPACITOR, FIXED, ELECTROLYTIC: aluminum; 150 μF -10%, +30%; 150 V; MIL-C-39018/1	81349	M39018/07-0317	
C22	C	Same as C21			
C23	C	Same as C9			
C24	C	Same as C9			
C25	C	Same as C7			
C26	C	Same as C8			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
C27	C	Same as C12			
C28	C	Same as C14			
C29	C	Same as C13			
CR1		Not Used			
CR2	C	SEMICONDUCTOR DEVICE, DIODE: MIL-S-19500/477	81349	JAN1N5802	
CR3	C	Same as CR2			
CR4		Not Used			
CR5		Not Used			
CR6	C	Same as CR2			
CR7	C	Same as CR2			
CR8	C	Same as CR2			
CR9	C	SEMICONDUCTOR DEVICE, DIODE: MIL-S-19500/286	81349	JAN1N4245	
CR10	C	Same as CR9			
CR11	C	SEMICONDUCTOR DEVICE, DIODE: MIL-S-19500/116	81349	JAN1N4148	
CR12	C	SEMICONDUCTOR DEVICE, DIODE: 100 Peak Input Voltage; 1A maximum, MIL-S-19500/429	81349	JAN1N5619	
CR13	C	Same as CR2			
CR14	C	Same as CR2			
CR15	C	Same as CR2			
CR16	C	Same as CR2			
CR17	C	SEMICONDUCTOR DEVICE, DIODE: 30 Peak Input Voltage; 8A maximum (Electrodynamics 7030056-1)	04713	1N5825	
CR18		Not Used			
CR19	C	SEMICONDUCTOR DEVICE, DIODE: 400 Peak Input Voltage; 2A maximum; MIL-S-19500/286	81349	JAN1N4246	
CR20	C	Same as CR19			
CR21	C	Same as CR19			
CR22	C	Same as CR19			
CR23	C	Same as CR17			
CR24	C	Same as CR17			
CR25	C	Same as CR11			
CR26	C	Same as CR9			
CR27	C	Same as CR9			
CR28	C	Same as CR9			
CR29	C	Same as CR9			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
CR30	C	Same as CR9			
CR31	C	Same as CR9			
CR32	C	Same as CR9			
CR33	C	Same as CR9			
L1	C	INDUCTOR, CHOKE: 0.120 MH	10236	7190048-1	
L2	C	INDUCTOR, CHOKE: 1.250 MH	10236	7190049-1	
L3	C	INDUCTOR, CHOKE: .0715 MH	10236	7190047-1	
MP1	C	PRINTED WIRING BOARD	10236	6260067-1	
MP2	C	INJECTOR/EJECTOR (Electrodynamics 8501044)	22589	NE-3001-W	
MP3	C	HEATSINK, TO-5 THERMACLIP	10236	7070040-1	
MP4	C	HEATSINK, DE POWER SUPPLY	10236	7070039-1	
MP5	C	CLIP, COMPONENT (Electrodynamics 8062049-11)	06915	V-1010	
MP6	C	CLIP, COMPONENT (Electrodynamics 8062049-10)	06915	V-1009	
MP7	C	CLIP, COMPONENT (Electrodynamics 8062049-3)	06915	V-1002	
Q1		Not Used			
Q2		Not Used			
Q3	C	TRANSISTOR: MOSFET; (Electrodynamics 7040049-1)	81483	IRF420	
Q4	C	Same as Q3			
Q5	C	Same as Q3			
R1	C	RESISTOR, FIXED, FILM: 499 ohms ±1%; 1/10 W; MIL-R-55182/3	81349	RNC55H4990FS	
R2	C	RESISTOR, FIXED, FILM: 619 ohms ±1%; 1/10 W; MIL-R-55182/3	81349	RNC55H6190FS	
R3	C	RESISTOR, FIXED, COMPOSITION: 20,000 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G203JS	
R4	C	RESISTOR, FIXED, FILM: 5,110 ohms ±5%; 1/4 W; MIL-R-55182/3	81349	RNC55H5111FS	
R5	C	Same as R4			
R6	C	RESISTOR, FIXED, COMPOSITION: 8,200 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G822JS	
R7	C	RESISTOR, FIXED, COMPOSITION: 1,000 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G102JS	
R8	C	RESISTOR, FIXED, FILM: 7,500 ohms ±1%; 1/10 W; MIL-R-55182/3	81349	RNC55H7501FS	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
R9	C	RESISTOR, FIXED, COMPOSITION: 30,000 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G303JS	
R10	C	RESISTOR, VARIABLE, WIREWOUND: 50,000 ohms ±1%; 3 W (Electrodynamics 7010045-1)	91637	RS-5-51K	
R11	C	RESISTOR, FIXED, COMPOSITION: 5,100 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G5R1JS	
R12	C	Same as R7			
R13	C	RESISTOR, FIXED, COMPOSITION: 20,000 ohms ±5%; 1 W; MIL-R-39008/3	81349	RCR32G203JS	
R14	C	Same as R13			
R15	C	RESISTOR, FIXED, WIREWOUND: 1 ohm ±1%; 1 W; MIL-R-39007/9	81349	RWR81S1R00FR	
R16	C	Same as R9			
R17	C	Same as R7			
R18	C	Same as R7			
R19	C	RESISTOR, FIXED, FILM: 576 ohms ±1%; 1/10 W; MIL-R-55182/3	81349	RNC55H5760FS	
R20	C	Same as R1			
R21	C	Same as R3			
R22	C	Same as R4			
R23	C	Same as R4			
R24	C	Same as R7			
R25	C	Same as R7			
R26	C	Same as R8			
T1	C	TRANSFORMER, ISOLATED OUTPUT	10236	7160044-1	
T2	C	TRANSFORMER, ISOLATED DRIVER	10236	7160045-1	
T3	C	TRANSFORMER, CURRENT SAMPLER	10236	7160046-1	
T4	C	TRANSFORMER, DE DRIVER, QUAD SECONDARY:	10236	7160047-1	
T5	C	Same as T3			
T6	C	TRANSFORMER, DE DRIVER, DUAL SECONDARY	10236	7160048-1	
T7	C	TRANSFORMER, LOW POWER: 115 V Primary, 20 V Secondary; V.C.T.	10236	7160049-1	
U1	C	IC, REGULATING PULSE WIDTH MODULATOR (Electrodynamics 7100373-1)	34333	SG1526	
U2	C	Same as U1			
U3	C	IC, VOLTAGE REGULATOR: -12 V, 0.5A (Electrodynamics 7100452-1)	27014	LM320H-12	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
U4	C	IC, VOLTAGE REGULATOR: 12 V, 0.5A (Electrodynamics 7100371-1)	07263	UA7812H	
XU1	C	CONNECTOR, IC SOCKET: 18 pins; low profile (Electrodynamics 7180132-4)	00779	641263-1	
XU2	C	Same as XU1			
XU3	C	SOCKET, TRANSISTOR, TO-5	10236	829009-1	
XU4	C	Same as XU1			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
N1A2A3/A4	B	DIGITAL SYNCHRO CONVERTER CCA	10236	4260061A1	
C1		Not Used			
C2		Not Used			
C3	C	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 0.1 μF ±10%; 50 V; MIL-C-39014/1	81349	M39014/01-1473	
C4	C	Same as C3			
C5	C	Same as C3			
C6	C	Same as C3			
C7		Not Used			
C8		Not Used			
C9	C	Same as C3			
C10		Not Used			
C11	C	Same as C3			
C12	C	Same as C3			
C13		Not Used			
C14	C	Same as C3			
C15		Not Used			
C16	C	Same as C3			
C17		Not Used			
C18	C	Same as C3			
C19	C	Same as C3			
C20		Not Used			
C21	C	Same as C3			
C22		Not Used			
C23	C	Same as C3			
C24		Not Used			
C25	C	Same as C3			
C26	C	Same as C3			
C27	C	Same as C3			
C28	C	Same as C3			
C29	C	Same as C3			
C30	C	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 0.01 μF ±10%; 100 V; MIL-C-39014/5	81349	M39014/01-1455	
C31	C	Same as C3			
C32	C	Same as C3			
C33	C	CAPACITOR, FIXED, ELECTROLYTIC: tantalum; 2.2 μF ±10%; 20 V; MIL-C-39003/1	81349	M39003/01-2283	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
C34	C	Same as C33			
C35	C	Same as C3			
C36	C	Same as C33			
C37	C	Same as C33			
C38	C	Same as C3			
C39	C	Same as C3			
C40	C	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 2700 pF ±10%; 100 V; MIL-C-39014/1	81349	M39014/01-1445	
C41	C	CAPACITOR, FIXED, ELECTROLYTIC: tantalum; non-polarizing; 6 μF ±10%; 20 V; MIL-C-39003/4	81349	M39003/4-0271	
C42	C	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 1.0 μF ±10%; 50 V; MIL-C-39014/2	81349	M39014/02-1407	
CR1	C	SEMICONDUCTOR DEVICE, DIODE: Switching, MIL-S-19500/116	81349	JAN1N4148	
CR2	C	SEMICONDUCTOR DEVICE, DIODE: Zener, 7.5 V; 1.5 W; MIL-S-19500/406	81349	JAN1N4462	
CR3	C	Same as CR2			
CR4	C	Same as CR1			
CR5	C	Same as CR1			
CR6	C	Same as CR1			
MP1	C	PRINTED WIRING BOARD	10236	6260061-1	
MP2	C	INJECTOR/EJECTOR (Electrodynamics 8501044)	22589	NE-3001-W	
Q1	C	TRANSISTOR: FET (Electrodynamics 7040050-1)	27014	2N5434	
Q2	C	Same as Q1			
Q3		Not Used			
Q4	C	TRANSISTOR: FET; MIL-S-195001/385	81349	JAN2N4857	
Q5	C	Same as Q4			
R1	C	RESISTOR, FIXED, COMPOSITION: 220,000 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G224JS	
R2	C	RESISTOR, FIXED, FILM: 16,000 ohms ±0.01%; 0.3 W; MIL-R-55182/9	81349	RNC90Y1602TR	
R3	C	Same as R2			
R4	C	RESISTOR, FIXED, CARBON: 33,000,000 ohms ±5%; 1/4 W; (Electrodynamics 7010044-1)	01121	CB3365	
R5	C	RESISTOR, FIXED, COMPOSITION: 16,000,000 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G166JS	
R6	C	RESISTOR, FIXED, FILM: 1,600,000 ohms ±1%; 1/8 W; MIL-R-55182/3	81349	RNC60H1604FS	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
R7	C	RESISTOR, FIXED, FILM: 3,200,000 ohms ±1%; 1/8 W; MIL-R-55182/3	81349	RNC60H3204FS	
R8	C	RESISTOR, FIXED, FILM: 6,420,000 ohms ±1%; 1/4 W; MIL-R-55182/5	81349	RNC65H6424FS	
R9	C	RESISTOR, FIXED, FILM: 12,700,000 ohms ±1%; 1/2 W; MIL-R-55182/6	81349	RNC70H1275FS	
R10	C	RESISTOR, FIXED, FILM: 1,280,000 ohms ±0.1%; 1/8 W; MIL-R-55182/3	81349	RNC60H1284BS	
R11	C	RESISTOR, FIXED, FILM: 640,000 ohms ±0.1%; 1/8 W; MIL-R-55182/3	81349	RNC60H6403BS	
R12	C	RESISTOR, FIXED, FILM: 320,000 ohms ±0.1%; 1/8 W; MIL-R-55182/3	81349	RNC60H3203BS	
R13	C	RESISTOR, FIXED, FILM: 160,000 ohms ±0.1%; 1/8 W; MIL-R-55182/3	81349	RNC60H1603BS	
R14	C	RESISTOR, FIXED, FILM: 128,000 ohms ±0.01%; 0.3 W; (Electrodynamics 7010043-1)	18612	E102C128K000T	
R15	C	RESISTOR, FIXED, FILM: 64,000 ohms ±0.01%; 0.3 W; MIL-R-55182/9	81349	RNC90Y6402TP	
R16	C	RESISTOR, FIXED, FILM: 32,000 ohms ±0.01%; 0.3 W; MIL-R-55182/9	81349	RNC90Y3202TR	
R17	C	RESISTOR, FIXED, COMPOSITION: 120 ohms ±5%; 1/2 W; MIL-R-39008/1	81349	RCR20G121JS	
R18	C	Same as R17			
R19	C	Same as R1			
R20	C	Same as R2			
R21	C	Same as R2			
R22	C	Same as R4			
R23	C	Same as R5			
R24	C	Same as R9			
R25	C	Same as R8			
R26	C	Same as R7			
R27	C	Same as R6			
R28	C	Same as R10			
R29	C	Same as R11			
R30	C	Same as R12			
R31	C	Same as R13			
R32	C	Same as R14			
R33	C	Same as R15			
R34	C	Same as R16			
R35	C	Same as R2			
R36	C	Same as R16			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
R37	C	Same as R2			
R38	C	Same as R16			
R39	C	RESISTOR, FIXED, COMPOSITION: 10,000 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G103JS	
R40	C	RESISTOR, FIXED, COMPOSITION: 22,000 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G223JS	
R41	C	RESISTOR, FIXED, FILM: 1,500 ohms ±1%; 1/8 W; MIL-R-55182/3	81349	RNC60H1502FS	
R42	C	RESISTOR, FIXED, COMPOSITION: 68,000 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G683JS	
R43	C	RESISTOR, FIXED, FILM: 20,000 ohms ±1%; 1/8 W; MIL-R-55182/3	81349	RNC60H2002FS	
R44	C	Same as R39			
R45	C	RESISTOR, FIXED, COMPOSITION: 100 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G101JS	
R46	C	Same as R45			
R47	C	Same as R39			
R48	C	RESISTOR, FIXED, COMPOSITION: 75,000 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G753JS	
R49	C	RESISTOR, FIXED, COMPOSITION: 2,000 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G202JS	
R50	C	RESISTOR, FIXED, FILM: 200,000 ohms ±1%; 1/8 W; MIL-R-55182/3	81349	RNC60H2003FS	
R51	C	RESISTOR, FIXED, FILM: 100,000 ohms ±1%; 1/8 W; MIL-R-55182/3	81349	RNC60H1003FS	
R52	C	RESISTOR, FIXED, COMPOSITION: 1,000,000 ohms ±1%; 1/8 W; MIL-R-39008/1	81349	RCR07G105JS	
R53	C	Same as R39			
R54	C	Same as R39			
R55	C	Same as R43			
R56	C	Same as R1			
R57	C	Same as R39			
R58	C	Same as R39			
R59	C	RESISTOR, FIXED, COMPOSITION: 5,100 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G512JS	
R60	C	Same as R59			
R61	C	Same as R39			
R62	C	Same as R39			
R63	C	Same as R39			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
R64	C	RESISTOR, FIXED, COMPOSITION: 33,000 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G333JS	
R65	C	Same as R52			
R66	C	RESISTOR, FIXED, COMPOSITION: 3,300 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G332JS	
R67	C	Same as R45			
R68	C	Same as R48			
R69	C	RESISTOR, FIXED, COMPOSITION: 3,000 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G302JS	
R70	C	Same as R50			
R71	C	Same as R51			
R72	C	Same as R52			
R73	C	RESISTOR, VARIABLE, NON-WIRE-WOUND: 100,000 ohms; MIL-R-39035B	81349	RJR24FX104P	
T1	C	TRANSFORMER, MAGNETIC	10236	7160042-1	
TP1	C	TEST POINT: White; MIL-C-39024/11	81349	M39024/11-01	
TP2	C	Same as TP1			
TP3	C	Same as TP1			
TP4	C	Same as TP1			
TP5	C	Same as TP1			
TP6	C	Same as TP1			
TP7	C	Same as TP1			
TP8	C	Same as TP1			
TP9	C	Same as TP1			
TP10	C	TEST POINT: Red; MIL-C-39024/11	81349	M39024/11-02	
TP11	C	TEST POINT: Purple; MIL-C-39024/11	81349	M39024/11-10	
TP12	C	TEST POINT: Black; MIL-C-39024/11	81349	M39024/11-03	
U1	C	IC, CMOS DUAL 4-INPUT NOR GATE (Electrodynamics 7100336-1)	27014	CD4002B	
U2	C	IC, CMOS QUAD BILATERAL SWITCH (Electrodynamics 7100320-1)	27014	CD4062B	
U3	C	Same as U2			
U4	C	Same as U2			
U5	C	Same as U2			
U6	C	IC, SYNC, 4-BIT UP/DOWN CONVERTER (Electrodynamics 7100344-1)	27014	CD4019B	
U7	C	Same as U6			
U8	C	Same as U6			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
U9	C	Same as U6			
U10	C	IC, HEX INVERTER (Electrodynamics 7100202-1)	27014	CD4069UBMJ/883	
U11	C	Same as U10			
U12	C	Same as U10			
U13	C	IC, 4-BIT FULL ADDER (Electrodynamics 7100343-1)	27014	CD4008B	
U14	C	Same as U13			
U15	C	Same as U13			
U16	C	Same as U13			
U17	C	Same as U2			
U18	C	Same as U2			
U19	C	Same as U2			
U20	C	Same as U2			
U21	C	IC, DUAL 4-CHANNEL MULTIPLEXER/ DEMULTIPLEXER (Electrodynamics 7100348-1)	27014	CD4052	
U22	C	Same as U21			
U23	C	IC, QUAD 2-INPUT NOR GATE (Electrodynamics 7100345-1)	27014	CD4001B	
U24	C	IC, CMOS QUAD 2-INPUT NAND GATE (Electrodynamics 7100250-1)	04713	MC14011BBCBS	
U25	C	IC, SYNC, 4-BIT UP/DOWN DECADE COUNTER (Electrodynamics 7100372-1)	02735	CD40193BF/3	
U26	C	Same as U24			
U27	C	IC, DUAL J-K MASTER/SLAVE FLIP-FLOP WITH SET AND RESET (Electrodynamics 7100341-1)	27014	CD4027B	
U28	C	IC, QUAD 741 OPERATIONAL AMPLIFIER (Electrodynamics 7100291-1)	27014	LM148J/883	
U29	C	IC, QUAD OPERATIONAL AMPLIFIER (Electrodynamics 7100351-1)	27014	LM124	
U30	C	IC, TIMER (Electrodynamics 7100292-1)	27014	LM555J	
U31	C	Same as U10			
U32	C	Same as U24			
U33	C	IC, OPERATIONAL AMPLIFIER, 8 PIN, TO-92 (Electrodynamics 7100342-1)	00665	OP05-883-J	
XQ1	C	TRANSISTOR PAD: TO-5	10236	8290009-1	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
XQ2	C	Same as XQ1			
XQ3		Not Used			
XQ4	C	Same as XQ1			
XQ5	C	Same as XQ1			
XU1	C	CONNECTOR, IC SOCKET: 14 pins; low profile (Electrodynamics 7180132-2)	00779	641261-1	
XU2	C	Same as XU1			
XU3	C	Same as XU1			
XU4	C	Same as XU1			
XU5	C	Same as XU1			
XU6	C	CONNECTOR, IC SOCKET: 16 pins; low profile (Electrodynamics 7180132-3)	00779	641262-1	
XU7	C	Same as XU6			
XU8	C	Same as XU6			
XU9	C	Same as XU6			
XU10	C	Same as XU1			
XU11	C	Same as XU1			
XU12	C	Same as XU1			
XU13	C	Same as XU6			
XU14	C	Same as XU6			
XU15	C	Same as XU6			
XU16	C	Same as XU6			
XU17	C	Same as XU1			
XU18	C	Same as XU1			
XU19	C	Same as XU1			
XU20	C	Same as XU1			
XU21	C	Same as XU6			
XU22	C	Same as XU6			
XU23	C	Same as XU1			
XU24	C	Same as XU1			
XU25	C	Same as XU6			
XU26	C	Same as XU1			
XU27	C	Same as XU6			
XU28	C	Same as XU1			
XU29	C	Same as XU1			
XU30	C	CONNECTOR, IC SOCKET: 8 pins; low profile (Electrodynamics 7180132-1)	00779	641260-1	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
XU31	C	Same as XU1			
XU32	C	Same as XU1			
XU33	C	SPREADER, IC SOCKET: 8 pins, 0.400 inch centers (Electrodynamics 8290013-1)	32559	700-130	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
N1A2A5	B	SYNCHRO OUTPUT BOARD CCA	10236	4260062A1	
C1	C	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 0.1 μF ±10%; 50 V; MIL-C-39014/1	81349	M39014/01-1473	
C2		Not Used			
C3	C	Same as C1			
C4		Not Used			
C5	C	Same as C1			
C6	C	Same as C1			
C7		Not Used			
C8	C	Same as C1			
C9	C	Same as C1			
C10	C	Same as C1			
C11	C	Same as C1			
C12		Not Used			
C13	C	Same as C1			
C14		Not Used			
C15	C	Same as C1			
C16		Not Used			
C17	C	Same as C1			
C18	C	Same as C1			
C19		Not Used			
C20	C	Same as C1			
C21		Not Used			
C22	C	Same as C1			
C23		Not Used			
C24	C	Same as C1			
C25		Not Used			
C26	C	CAPACITOR, FIXED, ELECTROLYTIC: tantalum; 2.2 μF ±10%; 15 V; MIL-C-39003/1	81349	M39003/01-2283	
C27	C	Same as C26			
C28	C	Same as C26			
CR1	C	SEMICONDUCTOR DEVICE, DIODE: Zener; 7.5 V; 1 W; MIL-S-19500/406	81349	JAN1N4462	
CR2	C	Same as CR1			
CR3	C	SEMICONDUCTOR DEVICE, DIODE: Transient voltage suppressor; 5 V minimum breakdown voltage; 23.8 A maximum peak pulse current (Electrodynamics 7030040-1)	12969	TVS505	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
MP1	C	PRINTED WIRING BOARD	10236	6260062-1	
MP2	C	INJECTOR/EJECTOR (Electrodynamics 8501044-1)	22589	NE-3001-W	
R1	C	RESISTOR, FIXED, COMPOSITION: 4,700 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G472JS	
R2	C	Same as R1			
R3	C	Same as R1			
R4	C	Same as R1			
R5	C	Same as R1			
R6	C	Same as R1			
R7	C	Same as R1			
R8	C	Same as R1			
R9	C	Same as R1			
R10	C	Same as R1			
R11	C	Same as R1			
R12	C	RESISTOR, FIXED, COMPOSITION: 6,800 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G682JS	
R13	C	Same as R1			
R14	C	Same as R1			
R15	C	Same as R1			
R16	C	Same as R1			
R17	C	Same as R1			
R18	C	Same as R1			
R19	C	Same as R1			
R20	C	Same as R1			
R21	C	Same as R1			
R22	C	Same as R1			
R23	C	Same as R1			
R24	C	Same as R1			
R25	C	RESISTOR, FIXED, COMPOSITION: 8,200 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G822JS	
R26	C	Same as R25			
R27	C	Same as R25			
R28	C	Same as R25			
R29	C	Same as R25			
R30	C	Same as R12			
R31	C	Same as R12			
R32	C	Same as R12			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
R33	C	Same as R12			
R34	C	Same as R12			
R35	C	Same as R1			
R36	C	Same as R1			
R37	C	Same as R1			
R38	C	Same as R1			
R39	C	Same as R1			
R40	C	Same as R1			
R41	C	Same as R1			
R42	C	Same as R1			
R43	C	Same as R1			
R44	C	Same as R1			
R45	C	Same as R1			
R46	C	Same as R1			
R47	C	Same as R1			
R48	C	Same as R1			
R49	C	Same as R1			
R50	C	Same as R1			
R51	C	Same as R12			
R52	C	Same as R12			
R53	C	Same as R12			
R54	C	Same as R1			
R55	C	Same as R1			
R56	C	Same as R1			
R57	C	Same as R12			
R58	C	Same as R12			
R59	C	Same as R1			
R60	C	Same as R1			
R61	C	Same as R1			
R62	C	Same as R1			
R63	C	Same as R1			
R64	C	Same as R1			
R65	C	Same as R1			
R66	C	Same as R1			
R67	C	Same as R12			
R68	C	Same as R1			
R69	C	Same as R1			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
R70	C	Same as R1			
R71	C	Same as R1			
R72	C	RESISTOR, FIXED, COMPOSITION: 120 ohms ±5%; 1/2 W; MIL-R-39008/2	81349	RCR20G121JS	
R73	C	Same as R72			
T1	C	TRANSFORMER:	10236	7160043-1	
TP1	C	TEST POINT: Red; MIL-S-15900/385	81349	M39024/11-02	
TP2	C	TEST POINT: Black; MIL-S-19500/291	81349	M39024/11-03	
TP3	C	TEST POINT: Purple; MIL-S-19500/251	81349	M39024/11-10	
TP4	C	Same as TP1			
U1	C	IC, CMOS QUADRUPLE BILATERAL SWITCH (Electrodynamics 7100320)	27014	CD4062B	
U2	C	Same as U1			
U3	C	Same as U1			
U4	C	Same as U1			
U5	C	IC, HEX INVERTER (Electrodynamics 7100202-1)	27014	CD4069UBMJ/ 883B	
U6	C	IC, BIPOLAR 32 x 8 PROM (Electrodynamics 7100350-1)	34371	HM1-7602B-8	
U7	C	Same as U6			
U8	C	Same as U6			
U9	C	Same as U6			
U10	C	Same as U6			
U11	C	IC, CMOS ADDER (Electrodynamics 7100352-1)	04713	MC14560BBEBS	
U12	C	Same as U11			
U13	C	Same as U11			
U14	C	Same as U11			
U15	C	IC, LOW POWER SCHOTTKY OCTAL INVERTER BUFFER (3-STATE) (Electrodynamics 7100273-1)	18324	S54LS240F/883B	
U16	C	Same as U15			
U17	C	IC, OCTAL D-TYPE TRANSPARENT LATCH AND EDGE TRIGGERED FLIP-FLOP (Electrodynamics 7100360-1)	18324	S54LS373F/883B	
U18	C	Same as U6			
U19	C	Same as U6			
U20	C	Same as U17			
U21	C	Same as U5			
U22	C	Same as U1			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
U23	C	Same as U1			
U24	C	Same as U1			
U25	C	Same as U1			
XU1	C	CONNECTOR, IC SOCKET: 14 pins; low profile (Electrodynamics 7180132-2)	00779	641261-1	
XU2	C	Same as XU1			
XU3	C	Same as XU1			
XU4	C	Same as XU1			
XU5	C	Same as XU1			
XU6	C	CONNECTOR, IC SOCKET: 16 pins; low profile (Electrodynamics 7180132-3)	00779	641262-1	
XU7	C	Same as XU6			
XU8	C	Same as XU6			
XU9	C	Same as XU6			
XU10	C	Same as XU6			
XU11	C	Same as XU6			
XU12	C	Same as XU6			
XU13	C	Same as XU6			
XU14	C	Same as XU6			
XU15	C	CONNECTOR, IC SOCKET: 20 pins; low profile (Electrodynamics 7180132-5)	00779	641264-1	
XU16	C	Same as XU15			
XU17	C	Same as XU15			
XU18	C	Same as XU6			
XU19	C	Same as XU6			
XU20	C	Same as XU15			
XU21	C	Same as XU1			
XU22	C	Same as XU1			
XU23	C	Same as XU1			
XU24	C	Same as XU1			
XU25	C	Same as XU1			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
N1A2A6	B	D.E. RECEIVER CCA	10236	4260065A1	
C1	C	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 0.1 μF ±10%; 50 V; MIL-C-39014/1	81349	M39014/01-1473	
C2	C	Same as C1			
C3	C	Same as C1			
C4		Not Used			
C5	C	Same as C1			
C6	C	Same as C1			
C7	C	Same as C1			
C8	C	Same as C1			
C9	C	Same as C1			
C10	C	Same as C1			
C11	C	Same as C1			
C12	C	Same as C1			
C13	C	Same as C1			
C14	C	Same as C1			
C15	C	Same as C1			
C16	C	Same as C1			
C17	C	Same as C1			
C18	C	Same as C1			
C19	C	Same as C1			
C20	C	Same as C1			
C21	C	Same as C1			
C22	C	CAPACITOR, FIXED, ELECTROLYTIC: tantalum; 10 μF; 10 V; MIL-C-39003/1	81349	M39003/01-2286	
C23	C	CAPACITOR, FIXED, ELECTROLYTIC: tantalum; 2.2 μF ±10%; 15 V; MIL-C-39003/1	81349	M39003/01-2283	
C24	C	CAPACITOR, FIXED, MICA DIELECTRIC: 27 pF ±5%; 50 V; MIL-C-39001/5		CMR03E270-JOYM	
CR1	C	SEMICONDUCTOR DEVICE, DIODE: Transient voltage suppressor; 5 V minimum breakdown voltage; 23.8 A maximum peak pulse current (Electrodynamics 7030040-1)	12969	TVS505	
MP1	C	PRINTED WIRING BOARD	10236	6260065-1	
MP2	C	INJECTOR/EJECTOR (Electrodynamics 8501044-1)	22589	NE-3001-W	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
R1	C	RESISTOR, FIXED, COMPOSITION: 1,000 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G104JS	
R2	C	RESISTOR, FIXED, COMPOSITION: 150 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G151JS	
R3	C	RESISTOR, FIXED, COMPOSITION: 470 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G471JS	
TP1	C	TEST POINT: White; MIL-C-39024/11	81349	M39024/11-01	
TP2	C	Same as TP1			
TP3	C	Same as TP1			
TP4	C	TEST POINT: Black; MIL-C-39024/11	81349	M39024/11-03	
TP5	C	TEST POINT: Red; MIL-C-39024/11	81349	M39024/11-02	
U1	C	IC, LOW POWER SCHOTTKY OCTAL INVERTER BUFFER (3-STATE) (Electrodynamics 7100273-1)	18324	S54LS240F/883B	
U2	C	IC, LOW POWER SCHOTTKY 4-BIT BINARY COUNTER (Electrodynamics 7100155-1)	18324	S54LS161F/883B	
U3	C	Same as U1			
U4	C	IC, SCHOTTKY HEX INVERTER (Electrodynamics 7100120-1)	18324	S54S04F/883B	
U5	C	IC, 4-LINE TO 10-LINE DECODER (Electrodynamics 7100442-1)	18324	S5442F/883B	
U6	C	IC, LOW POWER SCHOTTKY TRIPLE 3-INPUT POSITIVE NAND GATE (Electrodynamics 7100139-1)	18324	S54LS10F/883B	
U7	C	IC, LOW POWER SCHOTTKY QUADRUPLE 2-INPUT POSITIVE NAND GATE (Electrodynamics 7100135-1)	18324	S54LS00F/883B	
U8	C	IC, LOW POWER SCHOTTKY QUADRUPLE 2-INPUT POSITIVE OR GATE (Electrodynamics 7100144-1)	18324	S54LS32F/883B	
U9	C	IC, LOW POWER SCHOTTKY QUADRUPLE 2-INPUT POSITIVE AND GATE (Electrodynamics 7100138-1)	18324	S54LS08F/883B	
U10	C	IC, LOW POWER SCHOTTKY QUADRUPLE 2-INPUT POSITIVE NOR GATE (Electrodynamics 7100136-1)	18324	S54LS02F/883B	
U11	C	IC, SCHOTTKY OCTAL TRANSPARENT LATCH (3-STATE) (Electrodynamics 7100223-1)	27014	DM54S373J/883B	
U12	C	IC, LOW POWER SCHOTTKY 8-INPUT POSITIVE NAND GATE (Electrodynamics 7100143-1)	18324	S54LS30F/883B	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
U13	C	Same as U2			
U14	C	IC, PARITY GENERATOR (Electrodynamics 7100459-1)	18324	S54LS280F/883B	
U15	C	IC, LOW POWER SCHOTTKY 8-BIT SERIAL-IN, PARALLEL-OUT SHIFT REGISTER (Electrodynamics 7100218-1)	18324	S54LS164F/883B	
U16	C	Same as U15			
U17	C	IC, LOW POWER SCHOTTKY DUAL D-TYPE TRIGGERED FLIP-FLOP (Electrodynamics 7100145-1)	18324	S54LS74F/883B	
U18	C	Same as U17			
U19	C	IC, LOW POWER SCHOTTKY TRIPLE 3-INPUT POSITIVE NOR GATE (Electrodynamics 7100142-1)	18324	S54LS27F/883B	
U20	C	Same as U6			
U21	C	Same as U2			
XU1	C	CONNECTOR, IC SOCKET: 20 pins; low profile (Electrodynamics 7180132-5)	00779	641264-1	
XU2	C	CONNECTOR, IC SOCKET: 16 pins; low profile (Electrodynamics 7180132-3)	00779	641262-1	
XU3	C	Same as XU1			
XU4	C	CONNECTOR, IC SOCKET: 14 pins; low profile (Electrodynamics 7180132-2)	00779	641261-1	
XU5	C	Same as XU2			
XU6	C	Same as XU4			
XU7	C	Same as XU4			
XU8	C	Same as XU4			
XU9	C	Same as XU4			
XU10	C	Same as XU4			
XU11	C	Same as XU1			
XU12	C	Same as XU4			
XU13	C	Same as XU2			
XU14	C	Same as XU4			
XU15	C	Same as XU4			
XU16	C	Same as XU4			
XU17	C	Same as XU4			
XU18	C	Same as XU4			
XU19	C	Same as XU4			
XU20	C	Same as XU4			
XU21	C	Same as XU2			
Y1	C	CRYSTAL, 14.318 MHz	81349	CR64/U14.31818MHz	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
N1A2A7	B	D.E. CLOCK DISPLAY BOARD CCA	10236	4260066A1	
C1	C	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 0.1 μF ±10%; 50 V; MIL-C-39014/1	81349	M39014/01-1473	
C2	C	Same as C1			
C3	C	Same as C1			
C4	C	Same as C1			
C5		Not Used			
C6	C	Same as C1			
C7	C	Same as C1			
C8	C	Same as C1			
C9		Not Used			
C10	C	Same as C1			
C11	C	Same as C1			
C12		Not Used			
C13		Not Used			
C14	C	Same as C1			
C15	C	Same as C1			
C16	C	Same as C1			
C17		Not Used			
C18	C	Same as C1			
C19	C	Same as C1			
C20	C	Same as C1			
C21	C	Same as C1			
C22	C	Same as C1			
C23	C	Same as C1			
C24	C	Same as C1			
C25	C	Same as C1			
C26	C	Same as C1			
C27	C	Same as C1			
C28	C	CAPACITOR, FIXED, ELECTROLYTIC: tantalum; 2.2 μF ±10%; 20 V; MIL-C-39003/1	81349	M39003/01-2283	
C29	C	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 0.01 μF ±10%; 100 V; MIL-C-39014/1	81349	M39014/01-1455	
C30	C	Same as C28			
C31	C	Same as C29			
C32	C	Same as C29			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
C33	C	Same as C1			
C34		Not Used			
C35	C	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 82 pF ±10%; 200 V; MIL-C-39014/1	81349	M39014/01-1218	
C36	C	CAPACITOR, VARIABLE, CERAMIC DIELECTRIC: 7-35 pF; MIL-C-81/1	81349	CV11C450	
C37	C	CAPACITOR, FIXED, ELECTROLYTIC: tantalum; 47 μF ±10%; 20 V; MIL-C-39003/1	81349	M39003/01-2295	
C38	C	Same as C37			
C39	C	Same as C37			
C40	C	Same as C29			
C41	C	Same as C29			
C42	C	Same as C1			
C43	C	Same as C1			
C44	C	Same as C1			
C45	C	Same as C1			
C46	C	Same as C1			
CR1	C	SEMICONDUCTOR DEVICE, DIODE: Zener; 6.8 V; 500 MW; MIL-S-19500/127	81349	JAN1N754A-1	
CR2	C	SEMICONDUCTOR DEVICE, DIODE: Switching; MIL-S-19500/116	81349	JAN1N4148	
CR3	C	Same as CR2			
CR4	C	Same as CR2			
CR5	C	Same as CR2			
CR6	C	Same as CR2			
CR7	C	Same as CR2			
CR8	C	Same as CR2			
CR9	C	Same as CR2			
CR10	C	Same as CR2			
CR11	C	SEMICONDUCTOR DEVICE, DIODE: Zener; 6.2 V; MIL-S-19500/127	81349	JAN1N753A	
MP1	C	PRINTED WIRING BOARD	10236	6260066-1	
MP2	C	INJECTOR/EJECTOR (Electrodynamics 8501044-1)	22589	NE-3001-W	
Q1	C	TRANSISTOR: NPN; MIL-S-19500/255	81349	JAN2N2222A	
R1	C	RESISTOR, FIXED, COMPOSITION: 2,400 ohms ± 5%; 1/4 W; MIL-R-39008/1	81349	RCR07G242JS	
R2	C	RESISTOR, FIXED, COMPOSITION: 2,000 ohms ± 5%; 1/4 W; MIL-R-39008/1	81349	RCR07G202JS	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
R3	C	RESISTOR, FIXED, COMPOSITION: 100,000 ohms ±5%; 1/4 W; MIL-R-39008/3	81349	RCR07G104JS	
R4	C	RESISTOR, FIXED, FILM: 1,100 ohms ±1%; 1/8 W; MIL-R-55182/3	81349	RNC60H1101FS	
R5	C	RESISTOR, FIXED, FILM: 2,200 ohms ±1%; 1/8 W; MIL-R-55182/3	81349	RNC60H2211FS	
R6	C	Same as R3			
R7	C	Same as R3			
R8	C	RESISTOR, FIXED, COMPOSITION: 22,000,000 ohms ±5%; 1/4 W; MIL-R-39008/3	81349	RCR07G226JS	
R9	C	Same as R3			
R10	C	Same as R3			
R11	C	RESISTOR, FIXED, COMPOSITION: 3,300 ohms ±5%; 1/4 W; MIL-R-39008/3	81349	RCR07G332JS	
R12	C	Same as R11			
R13	C	RESISTOR, FIXED, COMPOSITION: 1,000 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G102JS	
R14	C	Same as R3			
R15	C	RESISTOR, FIXED, COMPOSITION: 47,000 ohms ±5%; 1/4 W; MIL-R-39008/3	81349	RCR07G473JS	
R16	C	Same as R3			
R17	C	Same as R3			
R18	C	Same as R3			
R19	C	Same as R3			
R20	C	Same as R3			
R21	C	Same as R3			
R22	C	Same as R3			
R23	C	Same as R3			
R24	C	Same as R3			
R25	C	Same as R3			
R26	C	Same as R3			
R27	C	Same as R3			
R28	C	Same as R3			
R29	C	Same as R3			
R30	C	Same as R3			
R31	C	Same as R3			
R32	C	Same as R3			
R33	C	Same as R3			
R34	C	Same as R3			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
R35	C	Same as R3			
R36	C	Same as R3			
R37	C	Same as R3			
R38	C	Same as R3			
R39	C	Same as R3			
R40	C	Same as R3			
R41	C	Same as R3			
R42	C	RESISTOR, FIXED, COMPOSITION: 4,300 ohms ±5%, 1/4 W; MIL-R-39008/1	81349	RCR07G432JS	
R43	C	RESISTOR, FIXED, COMPOSITION: 39,000 ohms ±5%; 1/4 W; MIL-R-39008/3	81349	RCR07G393JS	
R44	C	Same as R11			
R45	C	Same as R11			
R46	C	Same as R11			
R47	C	Same as R11			
R48	C	Same as R11			
R49	C	Same as R13			
R50	C	RESISTOR, FIXED, COMPOSITION: 75 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G750JS	
TP1	C	TEST POINT: Black; MIL-C-39024/11	81349	M39024/11-03	
TP2	C	TEST POINT: Red; MIL-C-39024/11	81349	M39024/11-02	
TP3	C	TEST POINT: Purple; MIL-C-39024/11	81349	M39024/11-10	
TP4	C	Same as TP2			
TP5	C	Same as TP2			
U1	C	IC, OCTAL D-TYPE TRANSPARENT LATCHES AND EDGE TRIGGERED FLIP-FLOP (Electrodynamics 7100360-1)	18324	S54LS373F/883B	
U2	C	Same as U1			
U3	C	IC, LOW POWER SCHOTTKY HEX D FLIP-FLOP	18324	S54LS174F/883B	
U4	C	Same as U3			
U5	C	IC, 8-BIT, HIGH SPEED, MULTIPLE DIGITAL-TO-ANALOG CONVERTER (Electrodynamics 7100355-1)	34335	DAC-08AQB	
U6	C	IC, DATA SELECTOR/MULTIPLEXER (Electrodynamics 7100358-1)	18324	S54LS251F/883B	
U7	C	Same as U6			
U8	C	IC, CMOS DUAL D-TYPE FLIP-FLOP (Electrodynamics 7100251-1)	27014	CD4013BF/3	
U9	C	IC, OSCILLATOR PRESCALER, 3.58 MHz to 60 Hz (Electrodynamics 7100215-1)	27014	MM5369AA/N	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
U10	C	IC, CMOS BCD-TO-DECIMAL DECODER (Electrodynamics 7100339-1)	27014	CD4028B	
U11	C	IC, QUADRUPLE 2-INPUT NOR GATE (Electrodynamics 7100345-1)	27014	CD4001B	
U12	C	IC, QUADRUPLE 2-INPUT NOR GATE (Electrodynamics 7100443-1)	27014	CD4071B	
U13	C	IC, ALARM CLOCK CALCULATOR (Electrodynamics 7100445-1)	27014	MM73178N	
U14	C	IC, 7-SEGMENT TO BCD CONVERTER (Electrodynamics 7100446-1)	27014	MM54C915	
U15	C	Same as U14			
U16	C	Same as U14			
U17	C	IC, TIMER (Electrodynamics 7100292-1)	27014	LM555J	
U18	C	Same as U14			
U19	C	IC, LOW POWER SCHOTTKY QUADRUPLE 2-INPUT EXCLUSIVE OR GATE (Electrodynamics 7100147-1)	27014	DM54LS86J/883B	
U20	C	IC, DUAL 4-INPUT POSITIVE AND GATE (Electrodynamics 7100225-1)	18324	S54LS21F/883B	
U21	C	Same as U19			
U22	C	IC, LOW POWER SCHOTTKY OCTAL INVERTER BUFFER (3-STATE) (Electrodynamics 7100273-1)	18324	S54LS240F/883B	
U23	C	Same as U20			
U24	C	Same as U1			
U25	C	Same as U1			
U26	C	Same as U1			
U27	C	Same as U1			
U28	C	IC, OPERATIONAL AMPLIFIER (Electrodynamics 7100169-2)	27014	LM741	
U29	C	IC, VOLTAGE COMPARATOR (Electrodynamics 7100159-1)	27014	LM111J/883	
XQ1	C	TRANSISTOR PAD: TO-5	10236	8290009-1	
XU1	C	CONNECTOR, IC SOCKET: 20 pins; low profile (Electrodynamics 7180132-5)	00779	641264-1	
XU2	C	Same as XU1			
XU3	C	CONNECTOR, IC-SOCKET: 16 pins; low profile (Electrodynamics 7180132-3)	00779	641262-1	
XU4	C	Same as XU3			
XU5	C	Same as XU3			
XU6	C	Same as XU3			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
XU7	C	Same as XU3			
XU8	C	CONNECTOR, IC SOCKET: 14 pins; low profile (Electrodynamics 7180132-2)	00779	641261-1	
XU9	C	CONNECTOR, IC SOCKET: 8 pins; low profile (Electrodynamics 7180132-1)	00779	641260-1	
XU10	C	Same as XU3			
XU11	C	Same as XU8			
XU12	C	Same as XU8			
XU13	C	CONNECTOR, IC SOCKET: 40 pins; low profile (Electrodynamics 7180132-9)	00779	641268-1	
XU14	C	CONNECTOR, IC SOCKET: 18 pins; low profile (Electrodynamics 7180132-4)	00779	641263-1	
XU15	C	Same as XU14			
XU16	C	Same as XU14			
XU17	C	Same as XU9			
XU18	C	Same as XU14			
XU19	C	Same as XU8			
XU20	C	Same as XU8			
XU21	C	Same as XU8			
XU22	C	Same as XU1			
XU23	C	Same as XU8			
XU24	C	Same as XU1			
XU25	C	Same as XU1			
XU26	C	Same as XU1			
XU27	C	Same as XU1			
XU28	C	SPREADER, IC: 8 pins; 0.400 inch centers (Electrodynamics 8290013-1)	32559	700-130	
XU29	C	Same as XU29			
Y1	C	CRYSTAL: 3.579545 MHz; 10 PPM MIL-C-3098/47	81349	CR69A/U3.579-MHz	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
N1A2A8	B	TRANSMITTER CCA	10236	4260064A1	
C1	C	CAPACITOR, FIXED, ELECTROLYTIC: tantalum; 22 μF ± 10%; 15 V; MIL-C-39014/1	81349	M39003/01-2271	
C2	C	CAPACITOR, FIXED, MICA DIELECTRIC: 10 pF ± 10%; 300 V; MIL-C-39001/5	81349	M39014/01-1473	
C3	C	Same as C2			
C4	C	Same as C2			
C5	C	Same as C2			
C6	C	Same as C2			
C7	C	Same as C2			
C8A	C	Same as C2			
C8B	C	Same as C2			
C9		Not Used			
C10	C	Same as C2			
C11	C	Same as C2			
C12	C	Same as C2			
C13	C	Same as C2			
C14	C	Same as C2			
C15	C	Same as C2			
C16	C	Same as C2			
C17	C	Same as C2			
C18	C	Same as C2			
C19	C	Same as C2			
C20	C	Same as C2			
C21	C	Same as C2			
C22	C	Same as C2			
C23	C	Same as C2			
C24	C	Same as C1			
C25	C	Same as C1			
C26	C	Same as C1			
C27	C	Same as C2			
C28	C	Same as C2			
C29	C	Same as C2			
C30	C	Same as C2			
C31	C	CAPACITOR, FIXED, MICA DIELECTRIC: 10 pF ± 10%; 300 V; MIL-C-39001/5	81349	CMR03C100-DOCM	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
C32	C	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 470 pF ±10%; 200 V; MIL-C-39014/1	81349	M39014/01-1231	
C33	C	CAPACITOR, FIXED, MICA DIELECTRIC: 27 pF ±5%; 50 V; MIL-C-39001/5	81349	CMR03E270-JOYM	
CR1	C	SEMICONDUCTOR DEVICE, DIODE: Transient voltage suppressor, 12 V minimum breakdown voltage, 53.7 A maximum peak pulse current (Electrodynamics 7030040-2)	12969	TVS512	
CR2	C	Same as CR1			
CR3	C	SEMICONDUCTOR DEVICE, DIODE: Transient voltage suppressor, 5 V minimum breakdown voltage, 23.8 A maximum peak pulse current (Electrodynamics 7030040-1)	12969	TVS505	
CR4	C	SEMICONDUCTOR DEVICE, DIODE: Zener; 5.1 V; 400 MW; MIL-S-19500/127F	81349	JAN1N757A	
MP1	C	PRINTED WIRING BOARD	10236	6260064-1	
MP2	C	INJECTOR/EJECTOR (Electrodynamics 8501044-1)	22589	NE-3001-W	
Q1	C	TRANSISTOR: MIL-S-19500/317	81349	JAN2N2369A	
Q2	C	Same as Q1			
R1	C	RESISTOR, FIXED, COMPOSITION: 10 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G100JS	
R2	C	Same as R1			
R3	C	Same as R1			
R4	C	Same as R1			
R5	C	Same as R1			
R6	C	Same as R1			
R7	C	Same as R1			
R8	C	Same as R1			
R9	C	Same as R1			
R10	C	Same as R1			
R11	C	Same as R1			
R12	C	Same as R1			
R13	C	Same as R1			
R14	C	Same as R1			
R15	C	Same as R1			
R16	C	Same as R1			
R17	C	RESISTOR, FIXED, COMPOSITION: 220 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G221JS	
R18	C	Same as R17			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
R19	C	RESISTOR, FIXED, COMPOSITION: 1,000 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G102JS	
R20	C	Same as R17			
R21	C	Same as R17			
R22	C	RESISTOR, FIXED, COMPOSITION: 750 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G751JS	
R23	C	Same as R17			
R24	C	Same as R17			
R25	C	Same as R22			
R26	C	Same as R19			
R27	C	Same as R17			
R28	C	Same as R17			
R29	C	RESISTOR, FIXED, COMPOSITION: 110 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G111JS	
R30	C	Same as R22			
R31	C	RESISTOR, FIXED, COMPOSITION: 3,900 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G392JS	
R32	C	Same as R29			
R33	C	RESISTOR, FIXED, COMPOSITION: 10,000 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G103JS	
R34	C	Same as R19			
R35	C	RESISTOR, FIXED, COMPOSITION: 680 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G681JS	
R36	C	RESISTOR, FIXED, COMPOSITION: 8,200 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G822JS	
R37	C	Same as R36			
R38	C	RESISTOR, FIXED, COMPOSITION: 5,100 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G512JS	
R39	C	Same as R36			
R40	C	RESISTOR, FIXED, COMPOSITION: 62,000 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G623JS	
R41	C	RESISTOR, FIXED, COMPOSITION: 150 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G151JS	
R42	C	RESISTOR, FIXED, COMPOSITION: 470 ohms ±5%; 1/4 W; MIL-R-39008/1	81349	RCR07G471JS	
TP1	C	TEST POINT: Black; MIL-C-39024/11	81349	M39024/11-03	
TP2	C	TEST POINT: Purple; MIL-C-39024/11	81349	M39024/11-10	
TP3	C	TEST POINT: Red; MIL-C-39024/11	81349	M39024/11-02	
TP4	C	TEST POINT: White; MIL-C-39024/11	81349	M39024/11-01	
TP5	C	Same as TP4			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
TP6	C	Same as TP4			
TP7	C	Same as TP4			
TP8	C	Same as TP4			
TP9	C	Same as TP3			
TP10	C	Same as TP4			
TP11	C	Same as TP4			
U1	C	IC, QUADRUPLE DUAL IN-LINE (Electrodynamics 7100456-1)	04713	MHQ6001	
U2	C	Same as U1			
U3	C	Same as U1			
U4	C	Same as U1			
U5	C	IC, 9-BIT ODD/EVEN PARITY GENERATOR/ CHECKER (Electrodynamics 7100356-1)	18324	S54LS280F/883B	
U6	C	IC, PARALLEL LOAD 8-BIT SHIFT REGISTER (Electrodynamics 7100346-1)	18324	S54LS165F/883B	
U7	C	Same as U6			
U8	C	IC, CMOS ANALOG MULTIPLEXER (Electrodynamics 7100455-1)	34371	HI-1818A-8	
U9	C	IC, HIGH SPEED VOLTAGE COMPARATOR (Electrodynamics 7100454-1)	07263	μA760HMQB	
U10	C	IC, LOW POWER SCHOTTKY OCTAL INVERTER BUFFER (3-STATE) (Electrodynamics 7100273-1)	18324	S54LS240F/883B	
U11	C	IC, LOW POWER SCHOTTKY OCTAL BUFFER (3-STATE) (Electrodynamics 7100268-1)	27014	DM54LS244J/883B	
U12	C	Same as U10			
U13	C	IC, LOW POWER SCHOTTKY 4-BIT BINARY COUNTER (Electrodynamics 7100155-1)	18324	S54LS161F/883B	
U14	C	IC, LOW POWER SCHOTTKY DUAL 4-INPUT POSITIVE NAND GATE (Electrodynamics 7100141-1)	18324	S54LS20F/883B	
U15	C	Same as U13			
U16	C	IC, BCD DECODER (Electrodynamics 7100363-1)	01295	SNC5445J	
U17	C	IC, LOW POWER SCHOTTKY TRIPLE 3-INPUT POSITIVE NAND GATE (Electrodynamics 7100139-1)	18324	S54LS10F/883B	
U18	C	IC, QUADRUPLE 2-INPUT POSITIVE – NAND SCHMITT TRIGGER (Electrodynamics 7100364-1)	27014	DM54LS132J/883B	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
U19	C	IC, LOW POWER SCHOTTKY HEX INVERTER (Electrodynamics 7100137-1)	18324	S54LS04F/883B	
U20	C	IC, MONOSTABLE MULTIVIBRATOR (Electrodynamics 7100453-1)	01295	SNJ54123J	
U21	C	IC, LOW POWER SCHOTTKY DUAL D-TYPE TRIGGERED FLIP-FLOP (Electrodynamics 7100145-1)	18324	S54LS74F/883B	
U22	C	Same as U13			
U23	C	IC, SCHOTTKY HEX INVERTER (Electrodynamics 7100120-1)	18324	S54S04F/883B	
XQ1	C	TRANSISTOR PAD: TO-5	10236	8290009-1	
XQ2	C	Same as XQ1			
XU1	C	CONNECTOR, IC SOCKET: 14 pins; low profile (Electrodynamics 7180132-2)	00779	641261-1	
XU2	C	Same as XU1			
XU3	C	Same as XU1			
XU4	C	Same as XU1			
XU5	C	Same as XU1			
XU6	C	CONNECTOR, IC SOCKET: 16 pins; low profile (Electrodynamics 7180132-3)	00779	641262-1	
XU7	C	Same as XU6			
XU8	C	Same as XU6			
XU9	C	SPREADER, IC SOCKET: 8 pins; 0.400 inch centers (Electrodynamics 8290013-1)	32559	700-130	
XU10	C	CONNECTOR, IC SOCKET: 20 pins; low profile (Electrodynamics 7180132-5)	00779	641264-1	
XU11	C	Same as XU10			
XU12	C	Same as XU10			
XU13	C	Same as XU6			
XU14	C	Same as XU1			
XU15	C	Same as XU6			
XU16	C	Same as XU6			
XU17	C	Same as XU1			
XU18	C	Same as XU1			
XU19	C	Same as XU1			
XU20	C	Same as XU6			
XU21	C	Same as XU1			
XU22	C	Same as XU6			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
XU23	C	Same as XU1			
Y1	C	CRYSTAL: 14.318180 MHz; MIL-C-39098/42	81349	CR64/U14.31818MHz	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
N1A2-A9	C	INPUT BUFFER WSR-74 CCA	10236	4260063A1	
C1		Not Used			
C2		Not Used			
C3		Not Used			
C4	C	CAPACITOR, FIXED, MICA DIELECTRIC: 400 pF ± 5%; 50 V; MIL-C-39001/1	81349	CMR03F401-JOYM	
C5	C	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 0.1 μF ± 10%; 50 V; MIL-C-39014/01	81349	M39014/01-1473	
C6		Not Used			
C7	C	Same as C5			
C8	C	Same as C5			
C9		Not Used			
C10	C	Same as C5			
C11		Not Used			
C12	C	Same as C5			
C13		Not Used			
C14	C	Same as C5			
C15		Not Used			
C16	C	Same as C5			
C17		Not Used			
C18A	C	Same as C5			
C18B	C	Same as C5			
C19		Not Used			
C20A	C	Same as C5			
C20B	C	Same as C5			
C21		Not Used			
C22A	C	Same as C5			
C22B	C	Same as C5			
C23		Not Used			
C24A	C	Same as C5			
C24B	C	Same as C5			
C25		Not Used			
C26A	C	Same as C5			
C26B	C	Same as C5			
C27A	C	Same as C5			
C27B	C	Same as C5			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
C28A	C	Same as C5			
C28B	C	Same as C5			
C29		Not Used			
C30A	C	Same as C5			
C30B	C	Same as C5			
C31		Not Used			
C32A	C	Same as C5			
C32B	C	Same as C5			
C33		Not Used			
C34A	C	Same as C5			
C34B	C	Same as C5			
C35		Not Used			
C36A	C	Same as C5			
C36B	C	Same as C5			
C37A	C	Same as C5			
C37B	C	Same as C5			
C38	C	CAPACITOR, FIXED, ELECTROLYTIC: tantalum; 1.2 μF ± 10%; 20 V; MIL-C-39003/01	81349	M39003/01-2279	
C39	C	Same as C38			
CR1	C	SEMICONDUCTOR DEVICE, DIODE: Transient voltage suppressor, 5 V minimum breakdown voltage, 23.8 A maximum peak pulse current (Electrodynamics 7030040-1)	12969	TVS505	
CR2	C	Same as CR1			
MP1	C	PRINTED WIRING BOARD (Electrodynamics 6260063)	10236	6260063-1	
MP2	C	INJECTOR/EJECTOR (Electrodynamics 8501044-1)	22589	NE-3001-W	
Q1	C	TRANSISTOR, NPN: T05; MIL-S-195001/255E	81349	JAN2N2222A	
R1	C	RESISTOR, FIXED, COMPOSITION: 8,200 ohms ± 5%; 1/4 W; MIL-R-39008/11	81349	RCR07G822JS	
R2	C	RESISTOR, FIXED, COMPOSITION: 5,600 ohms ± 5%; 1/4 W; MIL-R-39008/11	81349	RCR07G562JS	
R3	C	RESISTOR, FIXED, COMPOSITION: 1,600 ohms ± 5%; 1/4 W; MIL-R-39008/11	81349	RCR07G162JS	
R4	C	RESISTOR, FIXED, COMPOSITION: 75 ohms ± 5%; 1/4 W; MIL-R-39008/11	81349	RCR07G750JS	
R5	C	RESISTOR, FIXED, COMPOSITION: 12,000 ohms ± 5%; 1/4 W; MIL-R-39008/11	81349	RCR07G123JS	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
R6	C	RESISTOR, FIXED, COMPOSITION: 56,000 ohms ± 5%; 1/4 W; MIL-R-39008/11	81349	RCR07G563JS	
R7	C	Same as R2			
R8	C	Same as R5			
R9		Not Used			
R10	C	Same as R2			
R11	C	Same as R2			
R12	C	Same as R2			
R13	C	RESISTOR, FIXED, COMPOSITION: 430 ohms ± 5%; 1/4 W; MIL-R-39008/11	81349	RCR07G431JS	
R14	C	RESISTOR, FIXED, FILM: 21,500 ohms ± 1%; 1/8 W; MIL-R-55182/3	81349	RNC60H2152FS	
R15	C	RESISTOR, FIXED, COMPOSITION: 3,600 ohms ± 5%; 1/4 W; MIL-R-39008/11	81349	RCR07G362JS	
R16	C	RESISTOR, VARIABLE, NON-WIRE-WOUND: 20,000 ohms; 1/2 W; MIL-R-39935/2	81349	RJR24FX203P	
R17	C	Same as R1			
R18	C	Same as R1			
R19	C	RESISTOR, FIXED, COMPOSITION: 240 ohms ± 5%; 1/4 W; MIL-R-39008/1	81349	RCR07G241JS	
R20	C	Same as R19			
R21	C	Same as R1			
R22	C	RESISTOR, FIXED, COMPOSITION: 330 ohms ± 5%; 1/4 W; MIL-R-39008/1	81349	RCR07G331JS	
R23		Not Used			
R24	C	Same as R1			
R25	C	Same as R2			
R26	C	Same as R2			
R27	C	Same as R2			
R28	C	Same as R2			
R29	C	Same as R2			
R30	C	Same as R2			
R31	C	Same as R2			
R32	C	Same as R2			
R33	C	Same as R2			
R34	C	Same as R2			
R35	C	Same as R22			
R36	C	Same as R22			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
R37	C	Same as R22			
R38	C	Same as R22			
R39	C	Same as R22			
R40	C	Same as R22			
R41	C	Same as R22			
R42	C	Same as R22			
R43	C	Same as R22			
R44	C	Same as R22			
R45	C	Same as R2			
R46	C	Same as R2			
R47	C	Same as R2			
R48	C	RESISTOR, FIXED, COMPOSITION: 2,200 ohms ± 5%; 1/4 W; MIL-R-39008/1	81349	RCR07G222JS	
R49	C	Same as R2			
R50	C	Same as R2			
R51	C	Same as R2			
R52	C	Same as R2			
R53	C	Same as R2			
R54	C	Same as R2			
R55	C	Same as R22			
R56	C	Same as R22			
R57	C	Same as R19			
R58	C	Same as R22			
R59	C	Same as R22			
R60	C	Same as R22			
R61	C	Same as R22			
R62	C	Same as R22			
R63	C	Same as R22			
R64	C	Same as R22			
R65	C	Same as R2			
R66	C	Same as R2			
R67	C	Same as R2			
R68	C	Same as R2			
R69	C	Same as R2			
R70	C	Same as R2			
R71	C	Same as R2			
R72	C	Same as R2			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
R73	C	Same as R2			
R74	C	Same as R2			
R75	C	Same as R22			
R76	C	Same as R22			
R77	C	Same as R22			
R78	C	Same as R22			
R79	C	Same as R22			
R80	C	Same as R22			
R81	C	Same as R22			
R82	C	Same as R22			
R83	C	Same as R22			
R84	C	Same as R22			
R85	C	Same as R2			
R86	C	Same as R2			
R87	C	Same as R2			
R88	C	Same as R2			
R89	C	Same as R2			
R90	C	Same as R2			
R91	C	Same as R2			
R92	C	Same as R2			
R93	C	Same as R2			
R94	C	Same as R2			
R95	C	Same as R22			
R96	C	Same as R22			
R97	C	Same as R22			
R98	C	Same as R22			
R99	C	Same as R22			
R100	C	Same as R22			
R101	C	Same as R22			
R102	C	Same as R22			
R103	C	Same as R22			
R104	C	Same as R22			
R105	C	RESISTOR, FIXED, COMPOSITION: 1,000,000 ohms ± 5%; 1/4 W; MIL-R-39008/1	81349	RCR07G105JS	
TP1	C	TEST POINT: White; MIL-C-39024/11	81349	M39024/11-01	
TP2	C	Same as TP1			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
TP3	C	Same as TP1			
TP4	C	TEST POINT: Red; MIL-C-39024/11	81349	M39024/11-02	
TP5	C	TEST POINT: Orange; MIL-C-39024/11	81349	M39024/11-06	
TP6	C	TEST POINT: Black; MIL-C-39024/11	81349	M39024/11-03	
TP7	C	TEST POINT: Brown; MIL-C-39024/11	81349	M39024/11-04	
U1	C	IC, DUAL OPTO COUPLER (Electrodynamics 7040045-1)	50434	HCPL-2531	
U2	C	Same as U1			
U3	C	IC, HEX BUFFER DRIVE (Electrodynamics 7100357-1)	01295	SNC5407J	
U4	C	IC, MONOSTABLE MULTIVIBRATOR (Electrodynamics 7100318-1)	01295	SNC54121J	
U5	C	IC, LOW POWER SCHOTTKY OCTAL INVERTER BUFFER (3-STATE) (Electrodynamics 7100273-1)	18324	S54LS240F/883B	
U6	C	IC, OCTAL D-TYPE TRANSPARENT LATCH AND EDGE TRIGGERED FLIP-FLOP (Electrodynamics 7100360-1)	18324	S54LS373F/883B	
U7	C	Same as U6			
U8	C	IC, LOW POWER SCHOTTKY NON-INVERTING OCTAL BUFFER (3-STATE) (Electrodynamics 7100268-1)	27014	DM54LS244J/883B	
U9	C	Same as U6			
U10	C	Same as U6			
U11	C	IC, LOW POWER SCHOTTKY HEX SCHMITT TRIGGER INVERTER (Electrodynamics 7100140-1)	18324	S54LS14F/883B	
U12	C	Same as U11			
U13	C	Same as U11			
U14	C	Same as U11			
U15	C	Same as U11			
U16	C	Same as U11			
U17	C	Same as U11			
U18	C	Same as U1			
U19	C	Same as U1			
U20	C	Same as U1			
U21	C	Same as U1			
U22	C	Same as U1			
U23	C	Same as U1			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
U24	C	Same as U1			
U25	C	Same as U1			
U26	C	Same as U1			
U27	C	Same as U1			
U28	C	Same as U1			
U29	C	Same as U1			
U30	C	Same as U1			
U31	C	Same as U1			
U32	C	Same as U1			
U33	C	Same as U1			
U34	C	Same as U1			
U35	C	Same as U1			
U36	C	Same as U1			
U37	C	Same as U1			
U38	C	IC, VOLTAGE COMPARATOR (Electrodynamics 7100159-1)	27014	LM111J/883B	
XQ1	C	TRANSISTOR PAD: TO-5	10236	8290009-1	
XU1	C	CONNECTOR, IC SOCKET: 8 pins; low profile (Electrodynamics 7180132-1)	00779	641260-1	
XU2	C	Same as XU1			
XU3	C	CONNECTOR, IC SOCKET: 14 pins; low profile (Electrodynamics 7180132-2)	00779	641261-1	
XU4	C	Same as XU3			
XU5	C	CONNECTOR, IC SOCKET: 20 pins; low profile (Electrodynamics 7180132-5)	00779	641264-1	
XU6	C	Same as XU5			
XU7	C	Same as XU5			
XU8	C	Same as XU5			
XU9	C	Same as XU5			
XU10	C	Same as XU5			
XU11	C	Same as XU3			
XU12	C	Same as XU3			
XU13	C	Same as XU3			
XU14	C	Same as XU3			
XU15	C	Same as XU3			
XU16	C	Same as XU3			
XU17	C	Same as XU3			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
XU18	C	Same as XU1			
XU19	C	Same as XU1			
XU20	C	Same as XU1			
XU21	C	Same as XU1			
XU22	C	Same as XU1			
XU23	C	Same as XU1			
XU24	C	Same as XU1			
XU25	C	Same as XU1			
XU26	C	Same as XU1			
XU27	C	Same as XU1			
XU28	C	Same as XU1			
XU29	C	Same as XU1			
XU30	C	Same as XU1			
XU31	C	Same as XU1			
XU32	C	Same as XU1			
XU33	C	Same as XU1			
XU34	C	Same as XU1			
XU35	C	Same as XU1			
XU36	C	Same as XU1			
XU37	C	Same as XU1			
XU38	C	SPREADER, IC SOCKET: 8 pins; 0.400 inch centers; TO-92 (Electrodynamics 8290013-1)	32559	700-130	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
N1A2-A10	B	INPUT BOARD WSR57 CCA	10236	4260063A2	
C1		Not Used			
C2		Not Used			
C3		Not Used			
C4	C	CAPACITOR, FIXED, MICA DIELECTRIC: 400 pF ± 5%; 50 V; MIL-C-39001/1	81349	CMR03F401-JOYM	
C5	C	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 0.1 μF ± 10%; 50 V; MIL-C-39014/01	81349	M39014/01-1473	
C6		Not Used			
C7		Not Used			
C8	C	Same as C5			
C9		Not Used			
C10		Not Used			
C11		Not Used			
C12	C	Same as C5			
C13		Not Used			
C14	C	Same as C5			
C15		Not Used			
C16		Not Used			
C17		Not Used			
C18A	C	Same as C5			
C18B	C	Same as C5			
C19		Not Used			
C20		Not Used			
C21		Not Used			
C22		Not Used			
C23		Not Used			
C24A	C	Same as C5			
C24B	C	Same as C5			
C25		Not Used			
C26		Not Used			
C27		Not Used			
C28A	C	Same as C5			
C28B	C	Same as C5			
C29		Not Used			
C30		Not Used			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
C31		Not Used			
C32		Not Used			
C33		Not Used			
C34		Not Used			
C35		Not Used			
C36		Not Used			
C37		Not Used			
C38	C	CAPACITOR, FIXED, ELECTROLYTIC: tantalum; 1.2 μF ± 10%; 20 V; MIL-C-39003/01	81349	M39003/01-2279	
C39	C	Same as C38			
CR1	C	SEMICONDUCTOR DEVICE, DIODE: transient voltage suppressor, 5V minimum breakdown voltage, 23.8 A maximum peak pulse current (Electrodynamics 7030040-1)	12969	TVS505	
CR2	C	Same as CR1			
MP1	C	PRINTED WIRING BOARD	10236	6260063-1	
MP2	C	INJECTOR/EJECTOR (Electrodynamics 8501044-1)	22589	NE-3001-W	
Q1	C	TRANSISTOR: NPN; TO-5; MIL-S-195001/255E	81349	JAN2N2222A	
R1	C	RESISTOR, FIXED, COMPOSITION: 8,200 ohms ± 5%; 1/4 W; MIL-R-39008/11	81349	RCR07G822JS	
R2	C	RESISTOR, FIXED, COMPOSITION: 5,600 ohms ± 5%; 1/4 W; MIL-R-39008/11	81349	RCR07G562JS	
R3	C	RESISTOR, FIXED, COMPOSITION: 1,600 ohms ± 5%; 1/4 W; MIL-R-39008/11	81349	RCR07G162JS	
R4	C	RESISTOR, FIXED, COMPOSITION: 75 ohms ± 5%; 1/4 W; MIL-R-39008/11	81349	RCR07G750JS	
R5	C	RESISTOR, FIXED, COMPOSITION: 12,000 ohms ± 5%; 1/4 W; MIL-R-39008/11	81349	RCR07G123JS	
R6	C	RESISTOR, FIXED, COMPOSITION: 56,000 ohms ± 5%; 1/4 W; MIL-R-39008/11	81349	RCR07G563JS	
R7	C	Same as R2			
R8	C	Same as R5			
R9		Not Used			
R10		Not Used			
R11		Not Used			
R12		Not Used			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
R13	C	RESISTOR, FIXED, COMPOSITION: 430 ohms ± 5%; 1/4 W; MIL-R-39008/11	81349	RCR07G431JS	
R14	C	RESISTOR, FIXED, FILM: 21,500 ohms ± 1%; 1/8 W; MIL-R-55182/3	81349	RNC60H2152FS	
R15	C	RESISTOR, FIXED, COMPOSITION: 3,600 ohms ± 5%; 1/4 W; MIL-R-39008/1	81349	RCR07G362JS	
R16	C	RESISTOR, VARIABLE, NON-WIRE-WOUND: 20,000 ohms; 1/2 W; MIL-R-39035/2	81349	RJR24FX203P	
R17	C	Same as R1			
R18	C	Same as R1			
R19	C	RESISTOR, FIXED, COMPOSITION: 240 ohms ± 5%; 1/4 W; MIL-R-39008/11	81349	RCR07G241JS	
R20	C	Same as R19			
R21	C	Same as R1			
R22	C	RESISTOR, FIXED, COMPOSITION: 330 ohms ± 5%; 1/4 W; MIL-R-39008/1	81349	RCR07G331JS	
R23		Not Used			
R24	C	Same as R1			
R25	C	Same as R2			
R26	C	Same as R2			
R27	C	Same as R2			
R28	C	Same as R2			
R29		Not Used			
R30		Not Used			
R31		Not Used			
R32		Not Used			
R33		Not Used			
R34		Not Used			
R35	C	Same as R22			
R36	C	Same as R22			
R37	C	Same as R22			
R38	C	Same as R22			
R39		Not Used			
R40		Not Used			
R41		Not Used			
R42		Not Used			
R43		Not Used			
R44		Not Used			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
R45	C	Same as R2			
R46	C	Same as R2			
R47	C	Same as R2			
R48	C	RESISTOR, FIXED, COMPOSITION: 2,200 ohms ± 5%; 1/4 W; MIL-R-39008/1	81349	RCR07G222JS	
R49		Not Used			
R50		Not Used			
R51		Not Used			
R52		Not Used			
R53		Not Used			
R54		Not Used			
R55	C	Same as R22			
R56	C	Same as R22			
R57	C	Same as R19			
R58	C	Same as R22			
R59		Not Used			
R60		Not Used			
R61		Not Used			
R62		Not Used			
R63		Not Used			
R64		Not Used			
R65	C	Same as R2			
R66	C	Same as R2			
R67		Not Used			
R68		Not Used			
R69		Not Used			
R70		Not Used			
R71		Not Used			
R72		Not Used			
R73		Not Used			
R74		Not Used			
R75	C	Same as R22			
R76	C	Same as R22			
R77		Not Used			
R78		Not Used			
R79		Not Used			
R80		Not Used			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
R81		Not Used			
R82		Not Used			
R83		Not Used			
R84		Not Used			
R85	C	Same as R2			
R86	C	Same as R2			
R87		Not Used			
R88		Not Used			
R89		Not Used			
R90		Not Used			
R91		Not Used			
R92		Not Used			
R93		Not Used			
R94		Not Used			
R95	C	Same as R22			
R96	C	Same as R22			
R97		Not Used			
R98		Not Used			
R99		Not Used			
R100		Not Used			
R101		Not Used			
R102		Not Used			
R103		Not Used			
R104		Not Used			
R105	C	RESISTOR, FIXED, COMPOSITION: 1,000,000 ohms ± 5%; 1/4 W; MIL-R-39008/1	81349	RCR07G105JS	
TP1	C	TEST POINT: White; MIL-C-39024/11	81349	M39024/11-01	
TP2	C	Same as TP1			
TP3	C	Same as TP1			
TP4	C	TEST POINT: Red; MIL-C-39024/11	81349	M39024/11-02	
TP5	C	TEST POINT: Orange; MIL-C-39024/11	81349	M39024/11-06	
TP6	C	TEST POINT: Black; MIL-C-39024/11	81349	M39024/11-03	
TP7	C	TEST POINT: Brown; MIL-C-39024/11	81349	M39024/11-04	
U1	C	IC, DUAL OPTO COUPLER (Electrodynamics 7040045-1)	50434	HCPL-2531	
U2	C	Same as U1			
U3		Not Used			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
U4		Not Used			
U5	C	IC, LOW POWER SCHOTTKY OCTAL INVERTER BUFFER (3-STATE) (Electrodynamics 7100273-1)	18324	S54LS240F/883B	
U6		Not Used			
U7		Not Used			
U8	C	Same as U5			
U9		Not Used			
U10		Not Used			
U11		Not Used			
U12	C	IC, LOW POWER SCHOTTKY HEX SCHMITT TRIGGER INVERTER (Electrodynamics 7100140-1)	18324	S54LS14F/883B	
U13	C	Same as U12			
U14	C	Same as U12			
U15		Not Used			
U16		Not Used			
U17		Not Used			
U18	C	Same as U1			
U19	C	Same as U1			
U20		Not Used			
U21		Not Used			
U22		Not Used			
U23	C	Same as U1			
U24	C	Same as U1			
U25		Not Used			
U26		Not Used			
U27		Not Used			
U28	C	Same as U1			
U29		Not Used			
U30		Not Used			
U31		Not Used			
U32		Not Used			
U33	C	Same as U1			
U34		Not Used			
U35		Not Used			
U36		Not Used			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
U37		Not Used			
U38	C	IC, VOLTAGE COMPARATOR, TO-92 (Electrodynamics 7100159-1)	07236	μAF111HMQB	
XQ1	C	TRANSISTOR PAD: TO-5	10236	8290009-1	
XU1	C	CONNECTOR, IC SOCKET: 8 pins; low profile (Electrodynamics 7180132-1)	00779	641260-1	
XU2	C	Same as XU1			
XU3		Not Used			
XU4		Not Used			
XU5	C	CONNECTOR, IC SOCKET: 20 pins; low profile (Electrodynamics 7180132-5)	00779	641264-1	
XU6		Not Used			
XU7		Not Used			
XU8	C	Same as XU5			
XU9		Not Used			
XU10		Not Used			
XU11		Not Used			
XU12	C	CONNECTOR, IC SOCKET: 14 pins; low profile (Electrodynamics 7180132-2)	00779	641261-1	
XU13	C	Same as XU12			
XU14	C	Same as XU12			
XU15		Not Used			
XU16		Not Used			
XU17		Not Used			
XU18	C	Same as XU1			
XU19	C	Same as XU1			
XU20		Not Used			
XU21		Not Used			
XU22		Not Used			
XU23	C	Same as XU1			
XU24	C	Same as XU1			
XU25		Not Used			
XU26		Not Used			
XU27		Not Used			
XU28	C	Same as XU1			
XU29		Not Used			
XU30		Not Used			

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
XU31		Not Used			
XU32		Not Used			
XU33	C	Same as XU1			
XU34		Not Used			
XU35		Not Used			
XU36		Not Used			
XU37		Not Used			
XU38	C	SPREADER, IC SOCKET: 8 pins; 0.400 inch centers; TO-92 (Electrodynamics 8290013)	32559	700-130	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
N1N2-A11	B	EXTENDER CARD CCA	10236	4260080A1	
J1	C	CONNECTOR, ELECTRICAL (Electrodynamics 7180127-1)	05574	3VH36-1JN015-083	
J2	C	Same as J1			
MP1	C	PRINTED WIRING BOARD	10236	6260080-1	

Table 8-1. Parts List (Continued)

PARTS LIST					
Ref Des	Indent	Name of Part/Description	Mfr Code	JAN/MIL Mfr Part No.	Notes
N1N2 A12	C	BACKPLANE ASSEMBLY	10236	4260068A1	
E1	D	STUD, TERMINAL	96906	MS17121-6	
E2	D	Same as E1			
E3	D	Same as E1			
E4	D	Same as E1			
E5	D	Same as E1			
E6	D	Same as E1			
E7	D	Same as E1			
E8	D	Same as E1			
E9	D	Same as E1			
E10	D	Same as E1			
E11	D	Same as E1			
E12	D	Same as E1			
E13	D	Same as E1			
E14	D	Same as E1			
E15	D	Same as E1			
E16	D	Same as E1			
MP1	D	PRINTED WIRING BOARD	10236	6260068-1	
MP2	D	GUIDE, CARD (Electrodynamics 8501042-2)	32559	DC-450	
S1	D	SWITCH, MICRO (Electrodynamics 7152055-1)	91929	BZ-2RW80-D5	
S2	D	Same as S1			
TB1	D	TERMINAL BLOCK (Electrodynamics 8240059-2)	33333	4PCV-04-002	
XU1	D	CONNECTOR, IC SOCKET: 72 pins, low profile (Electrodynamics 7180125-1)	00779	3-583715-4	
XU2	D	CONNECTOR, IC SOCKET: 50 pins, low profile (Electrodynamics 7180146-02)	71787	DD-50PV	

Table 8-2. List of Manufacturers

Mfr Code	Manufacturer
00779	Amp Inc. P.O. Box 3608 Harrisburg, PA 17105
02735	RCA Corp. Solid State Division Route 202 Somerville, NJ 08876
04713	Motorola 5005 E. McDowell Road Phoenix, AZ 85008
06383	Panduit Corp. 17301 Ridgeland Tinley Park, IL 60477
07263	Fairchild Mountain View, CA 94042
07933	Raytheon Co. Semiconductor Div. Hq. 350 Ellis Street Mountain View, CA 94042
10236	Electrodynamics Inc. 1200 Hicks Road Rolling Meadows, IL 60008
11982	TRW Redondo Beach, CA
12969	Unitrode Corp. 580 Pleasant Street Watertown, MA 02172
18324	Signetics 811 E. Arques Sunnyvale, CA 94086
22589	Electro-Space Fabricators, Inc. Centrel Avenue Topton, PA 19562
24229	Geo. Risk Industries 802 S. Elm Kimball, NE 69145
27014	National 2900 Semiconductor Drive Santa Clara, CA 95051
28480	Hewlett-Packard Co. Corporate Headquarters 1501 Page Mill Road Palo Alto, CA 94304
30161	Aavid Engineering Inc. 30 Cook Court Laconia, NH 03246
34333	Silicon General Inc. 7382 Bolsa Avenue Westminister, CA 92683
34355	AMD Sunnyvale, CA
34649	Intel Santa Clara, CA 95051
46384	Penn Engineering & Manufacturing Corp. P.O. Box 311 Doylestown, PA 18901
56289	Spraque Electric Co. North Adams, MA 01247
70674	ADC Products Div. Magnetic Controls Co. 4900 West 78th Street Minneapolis, MN 55435
71400	Bussman Manufacturing Div. McGraw-Edison Co. 502 Earth City Plaza P.O. Box 14460 St. Louis, MO 63178

Table 8-2. List of Manufacturers (Continued)

Mfr Code	Manufacturer	Mfr Code	Manufacturer
71590	Centralab Electronics Division of Globe-Union Inc. P.O. Box 858 Hwy 20 W Fort Dodge, IA 50501	86928	Seastrom Manufacturing Co., Inc. 701 Sonora Avenue Glendale, CA 91201
81349	Military Specifications Promulgated by Military Departments/Agencies under Authority of Defense Standardization Manual 4120 3-M	94222	Southco Inc. Lester, PA 19113
82877	Rotron Inc. 7-9 Hasbrouck Lane Woodstock, NY 12498	95146	Alco Electronic Products Inc. P.O. Box 1348 Lawrence, MA 01842
		95263	Leecraft Manufacturing Co., Inc. 21-16 44th Road Long Island City, NY 11101

SECTION 9. INSTALLATION, INTEGRATION, AND CHECKOUT

9.1 INTRODUCTION. — This section contains information pertinent to the installation of the Isolation Distribution Equipment (IDE).

9.2 UNPACKING AND HANDLING. — Each IDE is packaged separately to provide maximum protection and ease of shipping by rail, truck, or ship. Precautionary procedures for the normal handling of delicate (fragile) electronic equipment are applicable. After unloading and removing the equipment from its shipping containers, examine it for shipping damage, particularly if a container shows such signs. If a unit is found to be damaged, do not attempt to operate it. The packing case containing the IDE unit should be handled and opened with care. Inspect these units for shipping damage, and check packing slip to ensure complete shipment. The IDE is shipped with cables and spare cards. After receiving the unit, carefully unpack it and inspect the unit for visible signs of damage. Do not open the front panel at this point. The unit should be mounted on the wall before opening. This is to insure that no cards will fall out. How the unit will be mounted to the wall will be determined at the site. The unit should be located within ten feet of a standard three wire, 120 volt, electric outlet. The cabling for the IDE is fifty feet long. This will also be a factor as to where the IDE will be mounted. Inventory of Installation Kit, Part Number 1130065 and a list of spare parts are listed in table 1-2.

9.3 POWER REQUIREMENTS. — The IDE requires a power source of 105-125 Vac, 60 $\pm$ 2 Hz, single phase.

9.4 ISOLATION. The IDE is electrically isolated from all other equipment by the use of isolation transformers or optical isolators on all inputs and outputs. User's equipment has to be isolated optically.

9.5 INSTALLATION PROCEDURES.

9.5.1 Wall Mounting. — Figure 9-1 shows a typical wall-mount installation. Use the appropriate supplied hardware depending on whether the IDE is to be mounted on a mason, wood, plaster, or wallboard surface.

1. Locate four holes on a wall on which the IDE is to be mounted. To do this, select one locator hole, then measure center-to-center for the remaining three holes, making sure the equipment will be level when mounted. Recommended height is to locate the top holes 72 inches from the floor.

2. Using appropriate hardware, mount the unit on the wall. Appropriate hardware is supplied with each IDE.

9.5.2 Installation Check.— Once the unit is mounted on the wall in an upright position, the front panel can be opened. This is done by turning the 5 screws on the right one-quarter turn to the left (counterclockwise). Carefully open the door and remove the packing material used to support the cards during shipment. Examine the inside of the unit (also the cards) for any visual damage.

9.5.3 Special Instructions.

9.5.3.1 WSR-57.

1. On the Input Buffer CCA N1A2A9, verify the following jumper positions:

   E3 and E4 - in; E2 - out

   E7 and D8 - in; E11 and E12 - out

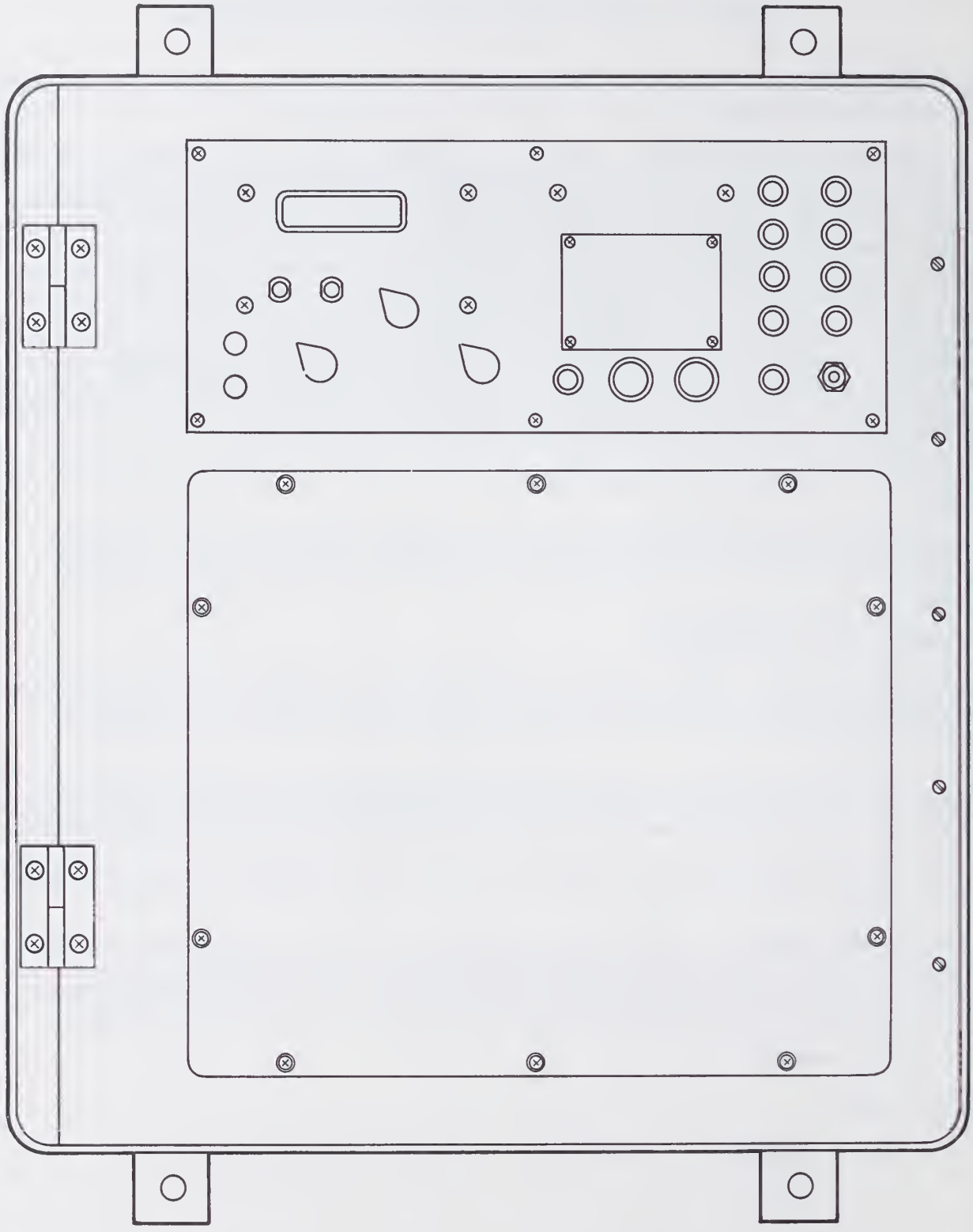


Figure 9-1. Typical Wall-Mount Installation

E9 and E10 - in; E5 and E6 out

E13 and E14 - in; E15 and E16 - out

2. Verify that IC A9U8 is a 54LS240, not a 54LS44.

9.5.3.2 WSR-74C.

1. On the Input Buffer CCA N1A2A9, verify the following jumper position:

E1 and E2 - in; E3 and E4 - out

E9 and E10 -in; E5 and E6 - out

E11 and E12 - in; E7 and E8 - out

E13 and E14 - in; E15 and E16 - out

2. Verify that IC A9U8 is a 54LS244, not a 54LS240.

3. Check the installation cable (9.5.5). Connect pin CC at the IDE end of the cable to pin FF at the radar end; and vice versa (pin FF to pin CC).

4. Perform modifications 10 and 16 of NWS Engineering Handbook No. 6 for WSR-74C.

9.5.3.3 WSR-74S.

1. Same as step 1 of 9.5.3.2.

2. Same as step 2 of 9.5.3.2.

3. Same as step 3 of 9.5.3.2.

4. Check the installation cable (9.5.5). Connect pin j at the IDE end of the cable to pin DD at the radar end; and vice versa (pin DD to pin j).

5. Perform modifications 13 and 17 of NWS Engineering Handbook No. 6 for WSR-74S.

9.5.4 IDE Wiring. — Refer to 9.5.4.1 for WSR-74 and to 9.5.4.2 for WSR-57.

9.5.4.1 WSR-74 Installation Wiring. — Provided in the installation kit are two 50-foot cables with connectors in place at the IDE end. The coaxial cable is for trigger input, and the shielded multi-conductor cable is for data. Connect both cables to the IDE, and route the cables from this point to the bottom rear of the radar console. Leave appropriate slack for connection 1J2 and 1J12. See figures 9-2 and 9-3 for connector assembly and table 9-1 for pinout and color code. After soldering the connectors, disconnect cables at the IDE, and using an ohmmeter, verify correct pinout. Turn radar power off and connect trigger cable to 1J12 and data cable to 1J2. Connect IDE end of the cables and return power to the radar.

9.5.4.2 WSR-57 Installation Wiring. — Provided in the installation kit are two 50-foot cables with the connectors in place of the IDE end. The larger of the two multi-conductor cables is for data input, and the smaller cable is for synchro input. Connect both cables to the IDE. Turn radar power off. Route the synchro cable to the rear of the console and through to the front center of the radar console between TB207 and TB209. Lace to existing harness, leaving appropriate slack for connection to TB207 and TB209. See figure 9-4 for connector assembly and table 9-2 for pinout and color code. Route the data cable to the bottom rear of the radar console and up through the interior into the DVIP cabinet via one of the two access holes (see DVIP installation). Leave appropriate slack so that the DVIP drawer may be pulled out to the service position. See figure 9-5 for connector assembly and

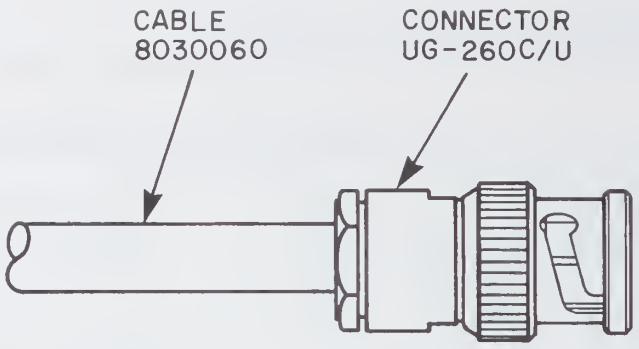


Figure 9-2. Connector Assembly, WSR-74 System Trigger Cable

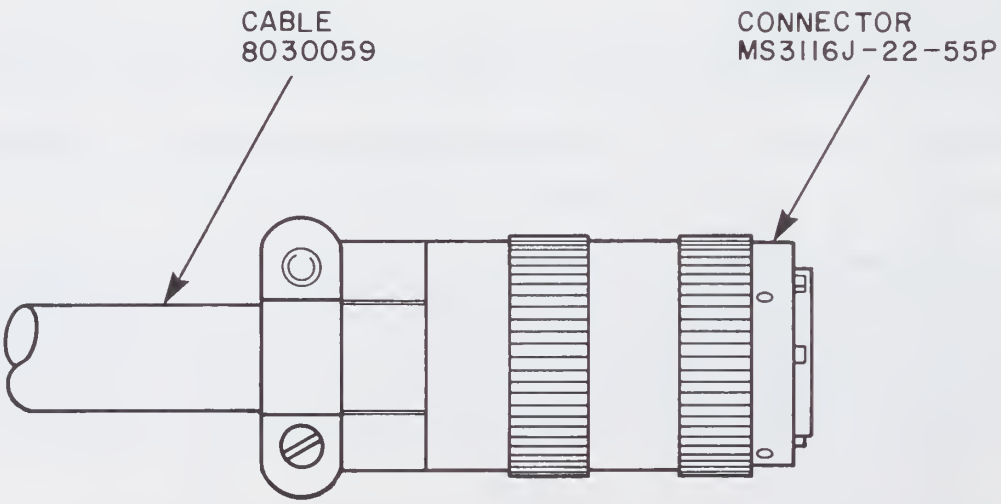


Figure 9-3. Connector Assembly, WSR-74 Data Cable

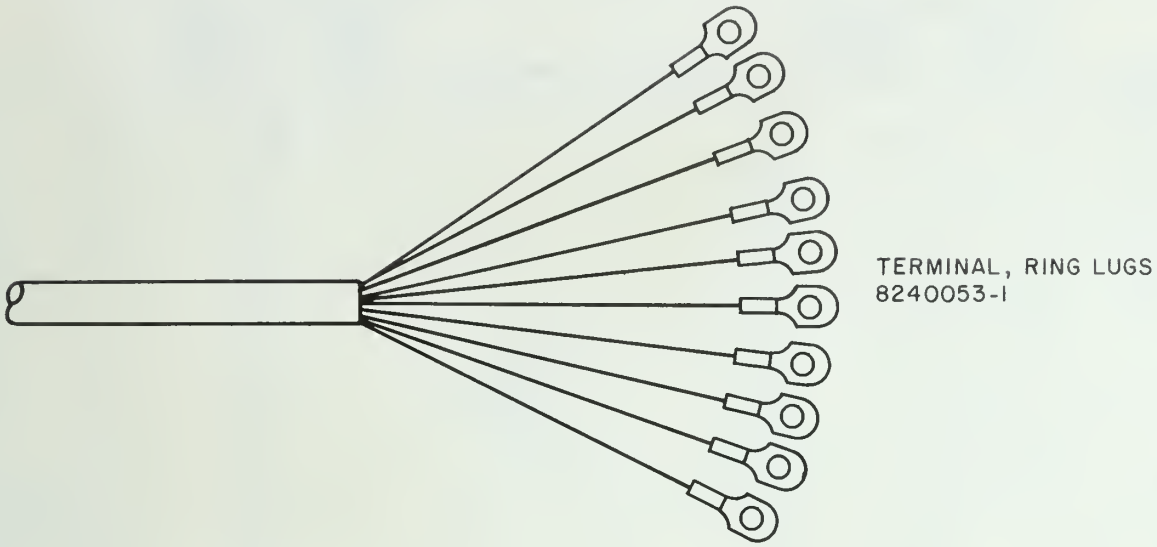


Figure 9-4. Connector Assembly, WSR-57 Synchro Cable

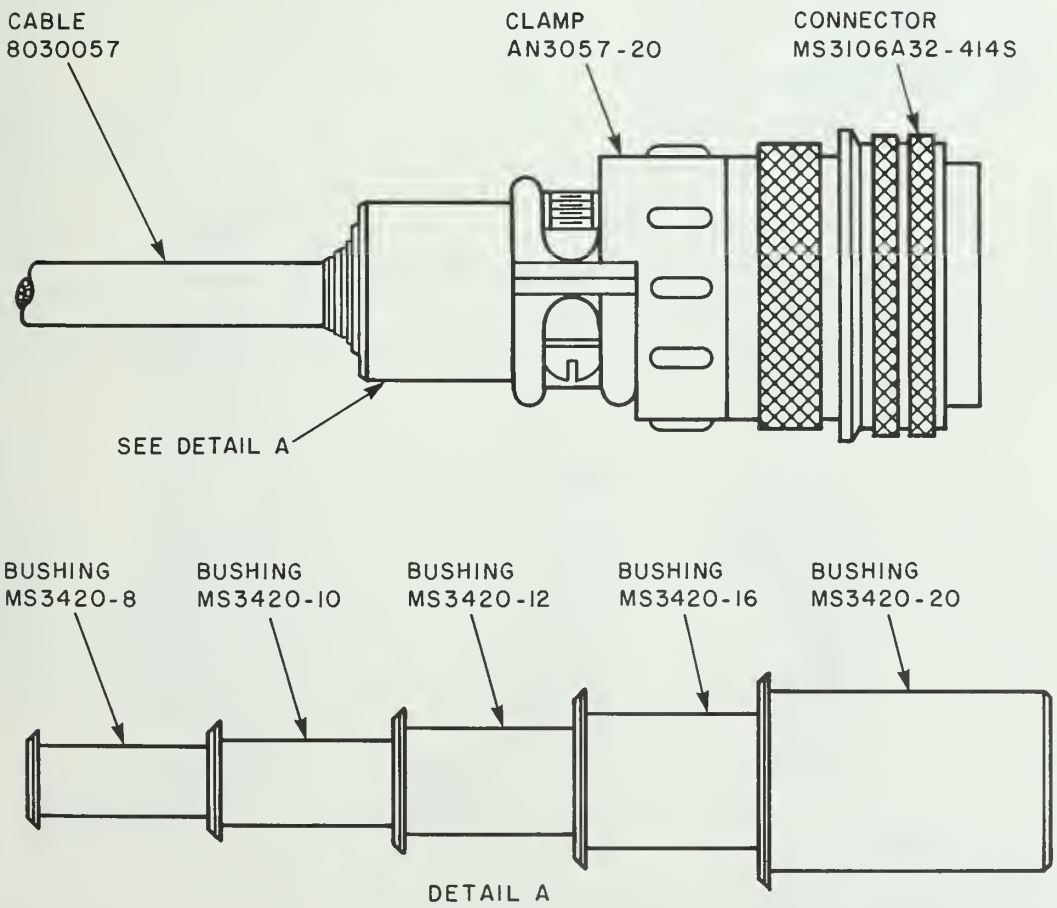


Figure 9-5. Connector Assembly, WSR-57 Data Cable

Table 9-1. WSR-74 Connections

FUNCTION	J2 PIN NO.	(Radar Console) SIGNAL NAME	
Antenna Azimuth Angle	A	Shield	
	B	0.1	BRN
	C	0.2	GRN
	D	0.4	BRN
	E	0.5	BLU
	F	1.0	BRN
	G	2.0	VIO
	H	4.0	BRN
	J	8.0	GRA
	K	10.0	RED
	L	20.0	ORG
	M	40.0	RED
	N	80.0	YEL
	P	100.0	RED
	R	200.0	GRN
	GG	$\overline{\text{INHIBIT}}$	WHT
	S	$\overline{\text{RETURN}}$	BLK
Monitor	i	$\overline{\text{IFATBPM}}$	BLK
	FF	Time Sample	BRN
	DD	Range Coverage	BLK
	CC	Test Level	RED
	EE	Not Used	
Monitor Computer Reg Out (8-bit)		N.C.	ORG
	BB	DATA READY	BLK
	z	VOL 8 (MSB)	WHT
	AA	RTN 8	GRA
	y	VOL 7	WHT
	x	RTN 7	VIO

FUNCTION	J2 PIN NO.	(Radar Console) SIGNAL NAME	
Monitor Computer Reg Out (8-bit)	w	VOL 6	WHT
	v	RTN 6	BLU
	u	VOL 5	GRN
	t	RTN 5	WHT
	s	VOL 4	YEL
	r	RTN 4	WHT
	q	VOL 3	ORG
	p	RTN 3	WHT
	n	VOL 2	RED
	m	RTN 2	WHT
	k	VOL 1	WHT
		(LSB)	
	j	RTN 1	BRN
Antenna Elevation Angle	h	0.1	BRN
	g	0.2	YEL
	f	0.4	BRN
	e	0.8	ORG
	d	1.0	BRN
	c	2.0	RED
	b	4.0	BLK
	a	8.0	GRA
	Z	10.0	BLK
	Y	20.0	VIO
	X	40.0	BLK
	W	80.0	BLU
	V	100.0	BLK
	U	200.0	GRN
	HH	$\overline{\text{INHIBIT}}$	BLK
	T	RETURN	YEL
System Trigger	J12	Trig. (Radar Console)	

} Indicates Twisted Pair

Table 9-2. WSR-57 Connections

FUNCTION	J11 PIN NO.	(DVIP Cabinet) SIGNAL NAME		FUNCTION	J11 PIN NO.	(DVIP Cabinet) SIGNAL NAME	
Computer Reg Out (8-bit)	A	C7 (MSB)	YEL	Monitor	p	C1	RED
	B	C7 rtn	BLK		r	C1 rtn	BRN
	E	C6	BLU		w	C0 (LSB)	RED
	F	C6 rtn	BLK		x	C0 rtn	GRN
	K	C5	BLU		2	TEST LVL	BRN
	L	C5 rtn	RED		3	$\overline{\text{DATA RDY}}$	BLK
	R	C4	GRN		v	TIME SAMPLE	RED
	S	C4 rtn	BLK		u	TIME SAMP. rtn	YEL
	Y	C3	WHT		4	$\overline{\text{DATA RDY}}$ rtn	WHT
	Z	C3 rtn	BLK		z	TEST LEVEL rtn	RED
	g	C2	RED		6	$\overline{\text{RANGE COVERAGE}}$	ORG
	h	C2 rtn	BLK		5	$\overline{\text{RANGE COVERAGE}}$ rtn	BLK

} Indicates Twisted Pair

FUNCTION	RADAR TERMINAL BLOCK	SIGNAL NAME	WIRE COLOR/ NUMBER	IDE J11 PIN
Synchro Data	TB207-1	AZ S1	BLK #1	A
	TB207-2	AZ S2	RED #1	B
	TB207-3	AZ S3	BLK #2	C
	TB209-5 EL	S1	WHT #2	D
	TB209-6	EL S2	BLK #3	E
	TB209-7	EL S3	GRN #3	F
	TB207-6	R1	BLK #4	G
	TB207-8	R2	BLU #4	H
	TB209-8	SYS TRIG	BLK #5	I
	GROUND		YEL #5	J

} Indicates Twisted Pair

CUT OFF BLACK WITHOUT NUMBER AND BROWN — NOT USED

table 9-2 for pinout and color code. After soldering the connectors, disconnect cables at the IDE; and,using an ohmmeter, verify correct point. Connect synchro cable to TB207 and TB209 and the data cable J11. Connect IDE end of the cables, and return power to the radar.

9.5.5 Connections. — All cable and mating connectors shall be provided for connection of the distribution equipment to either type radar. Cable distance shall be 50-feet. The system trigger is available at the bottom of the console on both radars. For WSR-74 radars, the remainder of information is located at the bottom rear of the console on J2 (MS3116F-22-55P). For WSR-57 the synchro information is in the bottom front of the console on #6 barrier strips. The DVIP information is on top of the console directly out of the DVIP J11 (MS3106A-32-414S). Pinout for all signals is located in tables 9-1 and 9-2.

9.6 FINAL CHECKOUT. — Locate the power cord and plug it into the IDE ac power input. Insure that the IDE power switch is off and plug the cord into an ac outlet. The battery charger light should now be on. Turn the main IDE power switch. Verify that all front panel power supply lights are on.

9.6.1 Equipment Turn-On.

a. Note that the battery charger lamp is on.*

b. Set the power switch ON.

1. Power indication lamp is on.*

2. Two indicating fuse lamps are off. (System will operate with one lamp on. Maintenance is required).

3. All eight power supply voltage status indicator lamps are on. (System will operate if one of each type (i.e., +11V) indicator lamp is on. Maintenance is required.)

4. Status Display — all four characters light with any digit.

* System may be functional without. Maintenance is required.

9.6.2 Radar Trigger Adjustment. — Open the unut and locate the Input Buffer CCA N1A2A9. Using an oscilloscope, connect the probe (X10) to TP2 signal and TP7 isolated ground. Adjust R16 on the Input Buffer CCA while looking at the scope for a stable trigger pulse waveform. When the trigger pulse waveform is stable, add one turn. This is the only internal ajdustment. Adjustment of the time/date is described in Section 3, Paragraph 3.3.3.

9.6.3 Status Check. — To verify the IDE status, perform the following procedure:

a. Set DVIP test/normal switch to TEST.

b. Set DVIP time sample switch to 15.

c. Set transmitter pulse width to SHORT and IF attenuator (WSR-74) to OFF.

d. Set IDE status select switch to SYNC STATUS. Position display on IDE should read FF00 (WSR-74C should indicate FF04 instead of FF00).

e. Set transmitter pulse width to LONG. Position display on IDE should read FF04 for all types of radar.

f. Set DVIP test/normal switch to NORM. Observe FF05 on IDE readout.

g. Return DVIP test/normal switch to TEST.

h. Set DVIP time sample switch to 31. Observe FF06 on IDE readout.

i. Return DVIP time sample switch to 15.

j. For WSR-74 only, turn on IF attenuator and observe FF0C on IDE readout. Set IF attenuator to OFF.

k. Verify correct azimuth and elevation. Compare reading.

l. Verify DVIP data by injecting internal DVIP test ramp and comparing to the IDE front panel jack with an oscilloscope. Use the IDE front panel trigger jack for triggering.

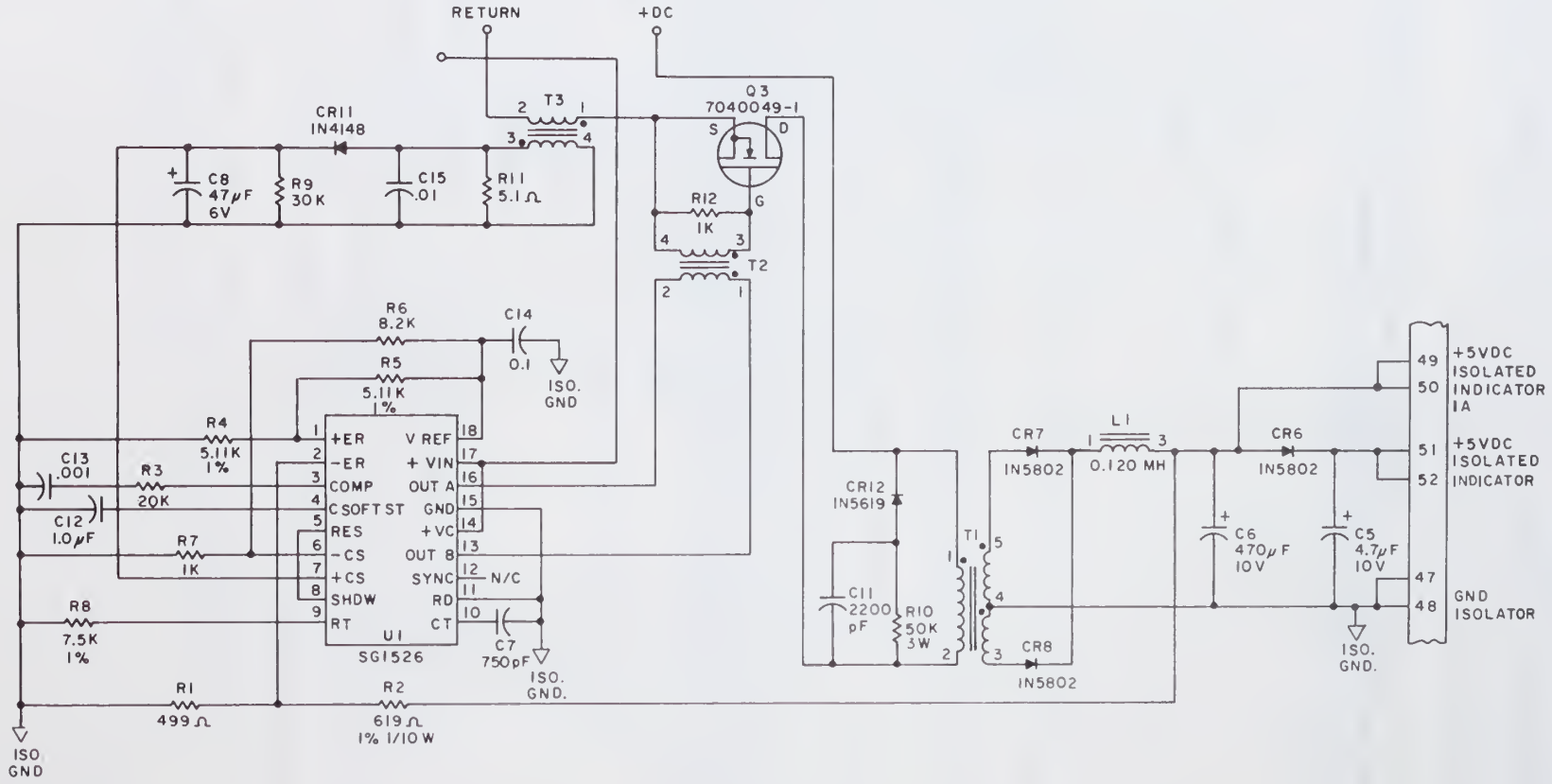


Figure 2-13. Switching Converter with Isolated 5 Vdc Output

INSTRUCTION BOOK

ISOLATION DISTRIBUTION EQUIPMENT

VOLUME 2

CONTRACT DOT FA78WA-4211

CONTRACTOR
ELECTRODYNAMICS, INC.
1200 HICKS ROAD
ROLLING MEADOWS, ILLINOIS 60008

MADE FOR
U.S. DEPARTMENT OF COMMERCE
NATIONAL WEATHER SERVICE

SECTION 10. TROUBLESHOOTING SUPPORT DATA

10.1 INTRODUCTION. — This section contains parts location illustrations, schematic diagrams, interconnection diagrams, power distribution diagram, and signal flow diagram for the Isolation Distribution Equipment (IDE).

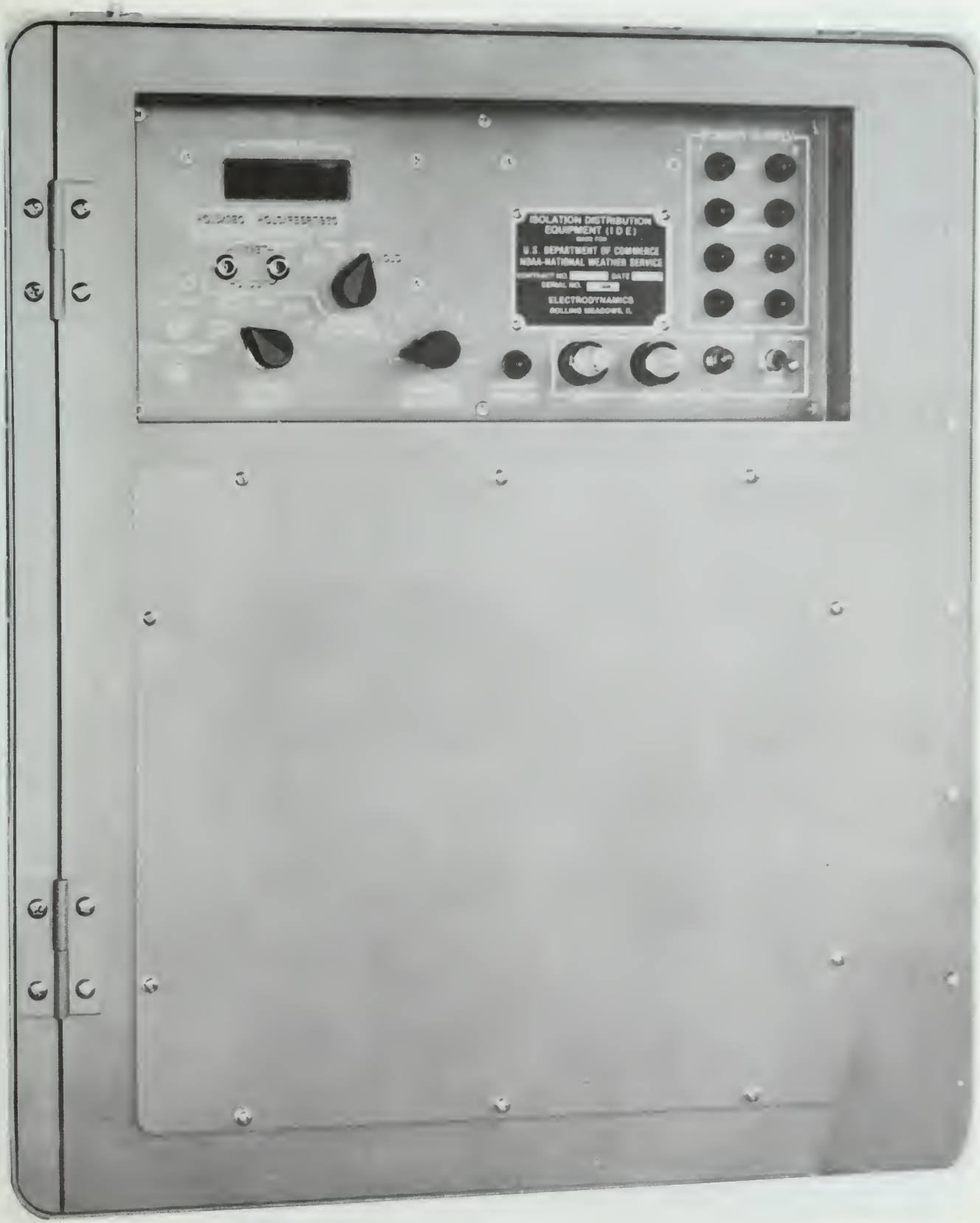


Figure 10-1. IDE Front View with Access Cover in Place

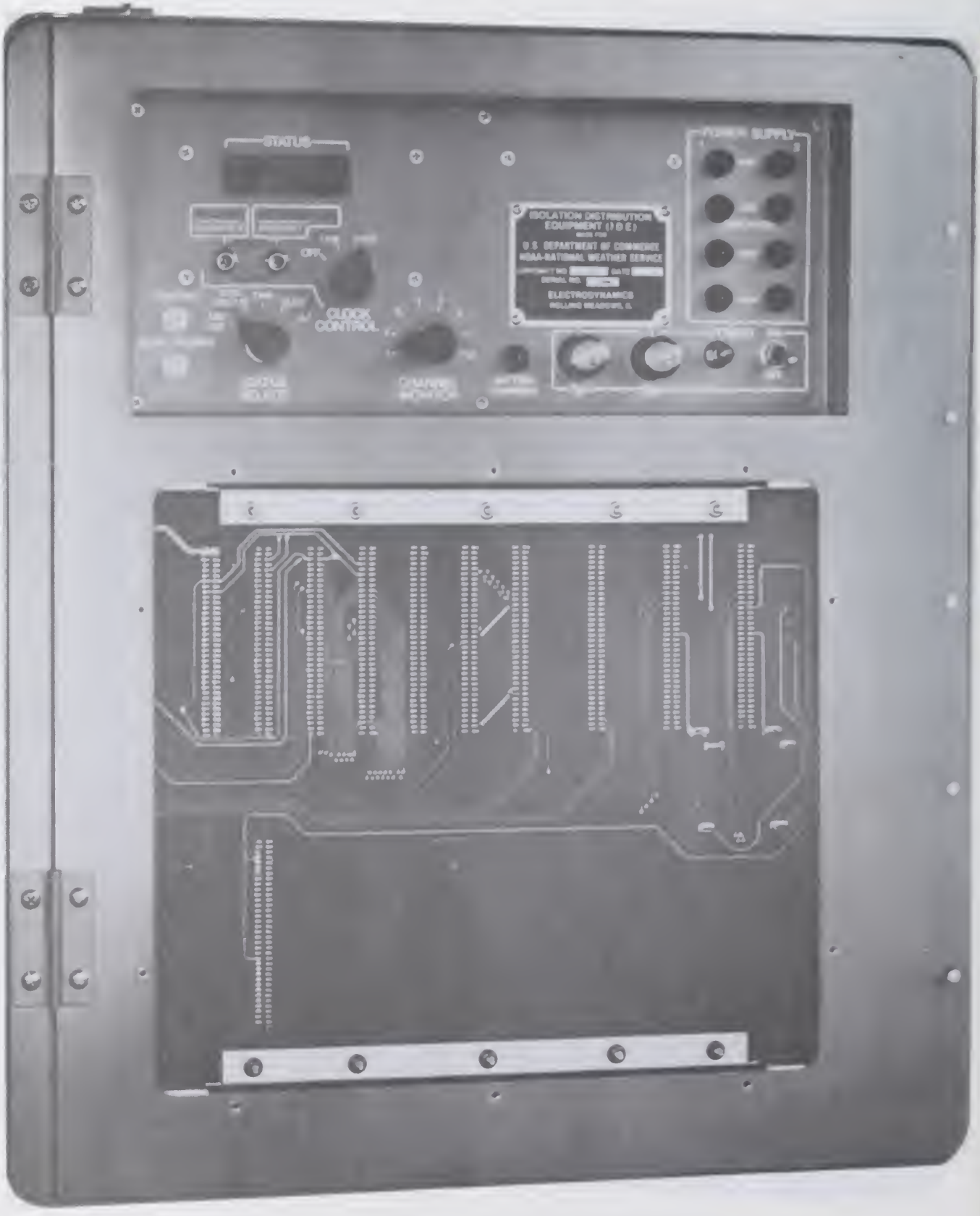


Figure 10-2. IDE Front View with Access Cover Removed

Figure 10-3. Control Panel Assembly — Front View, Parts Location

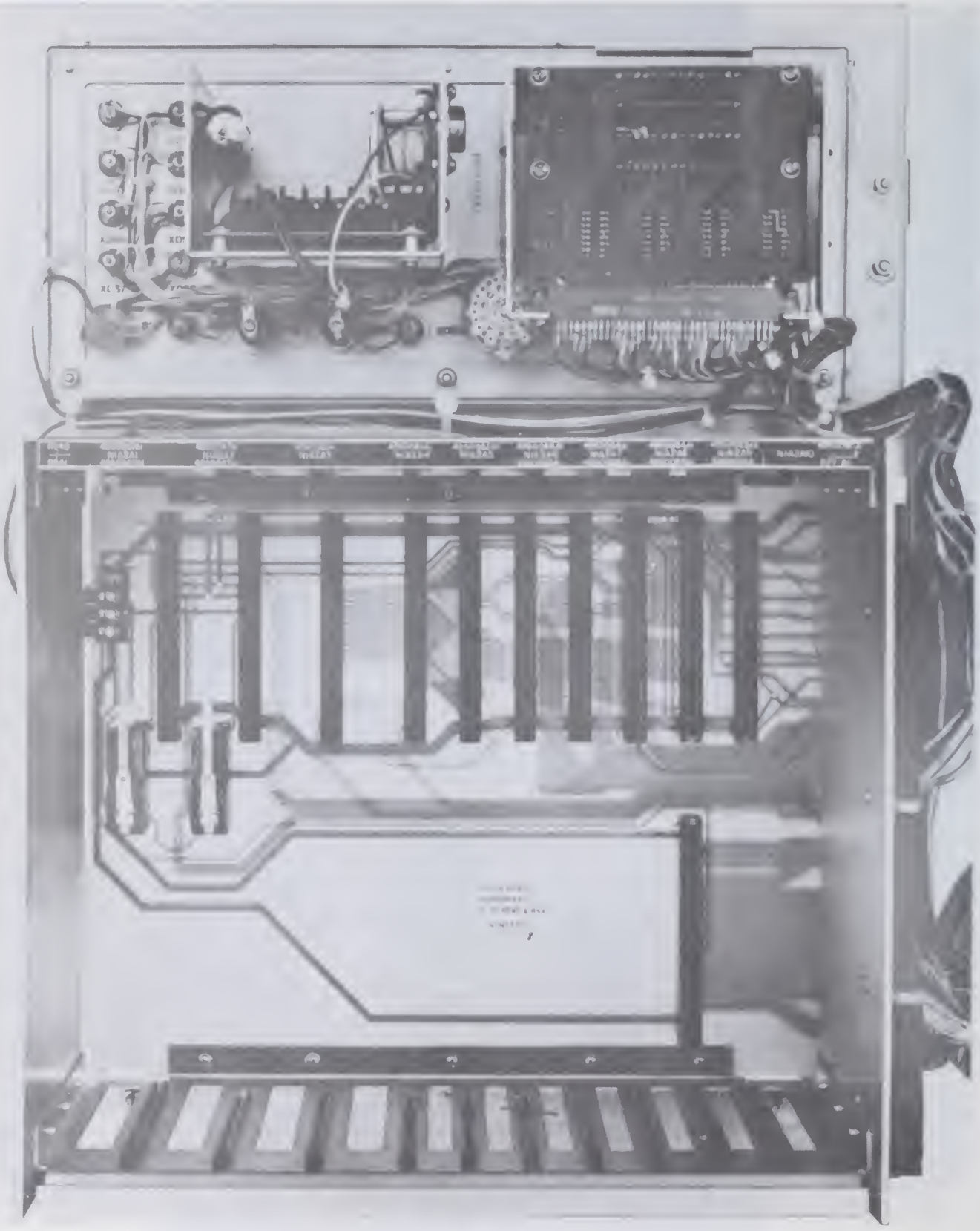


Figure 10-4. Front Panel Assembly — Rear View, Parts Location (Cards Removed)

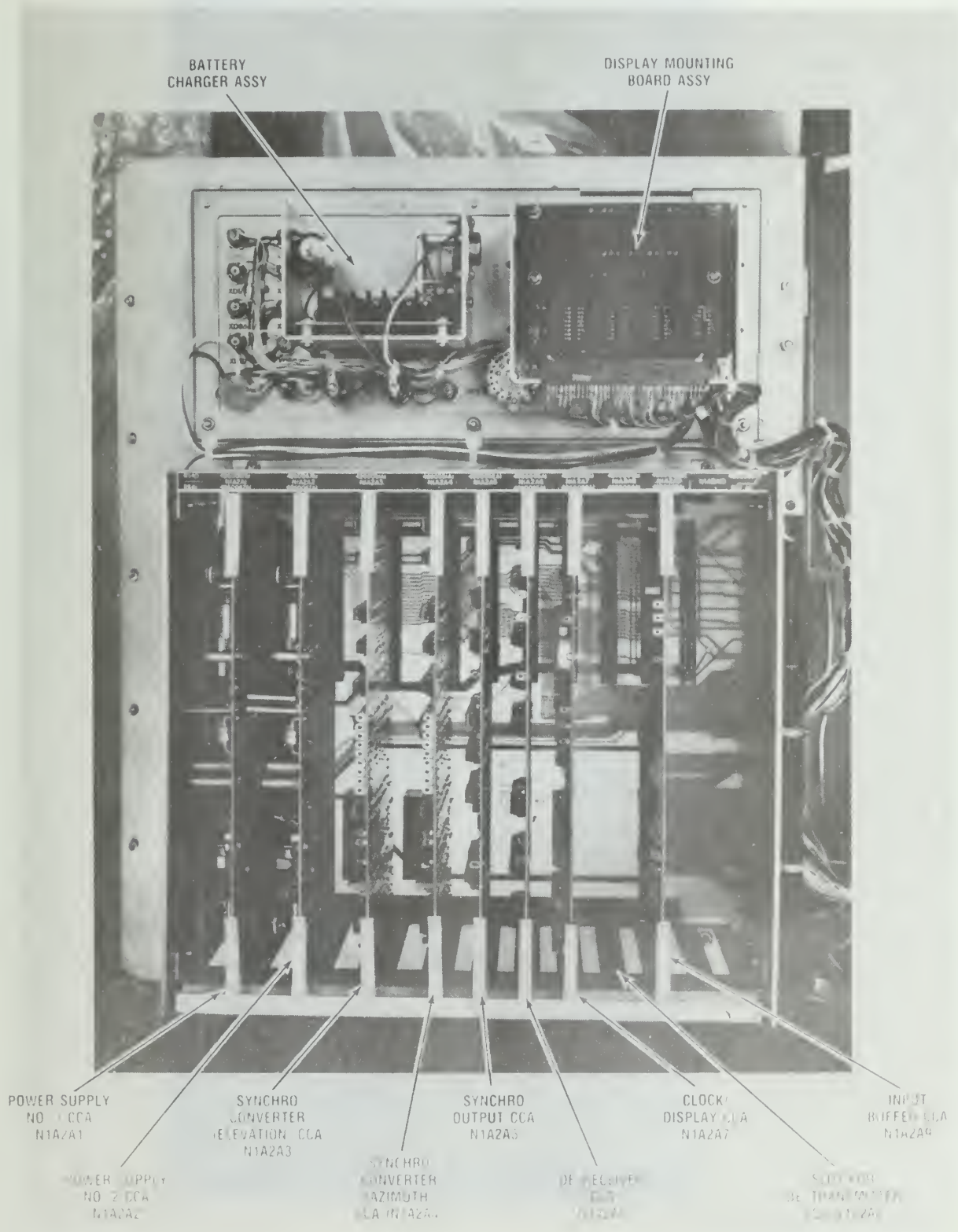


Figure 10-5. Front Panel Assembly — Rear View, Parts Location (Cards in Place)

Figure 10-6. Connector Panel Assembly, Parts Location

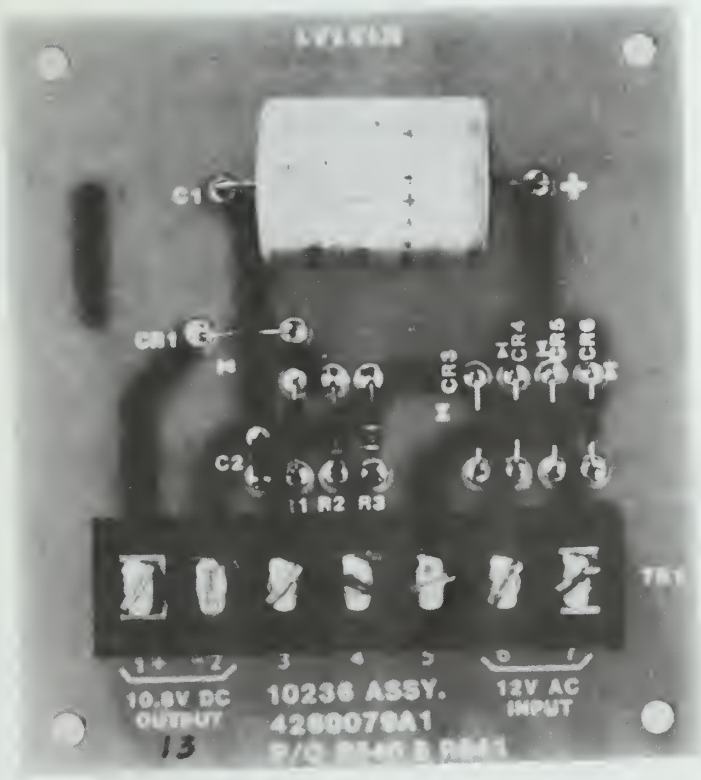


Figure 10-7. Battery Charger CCA N1A1A1 — Component and Wiring Sides

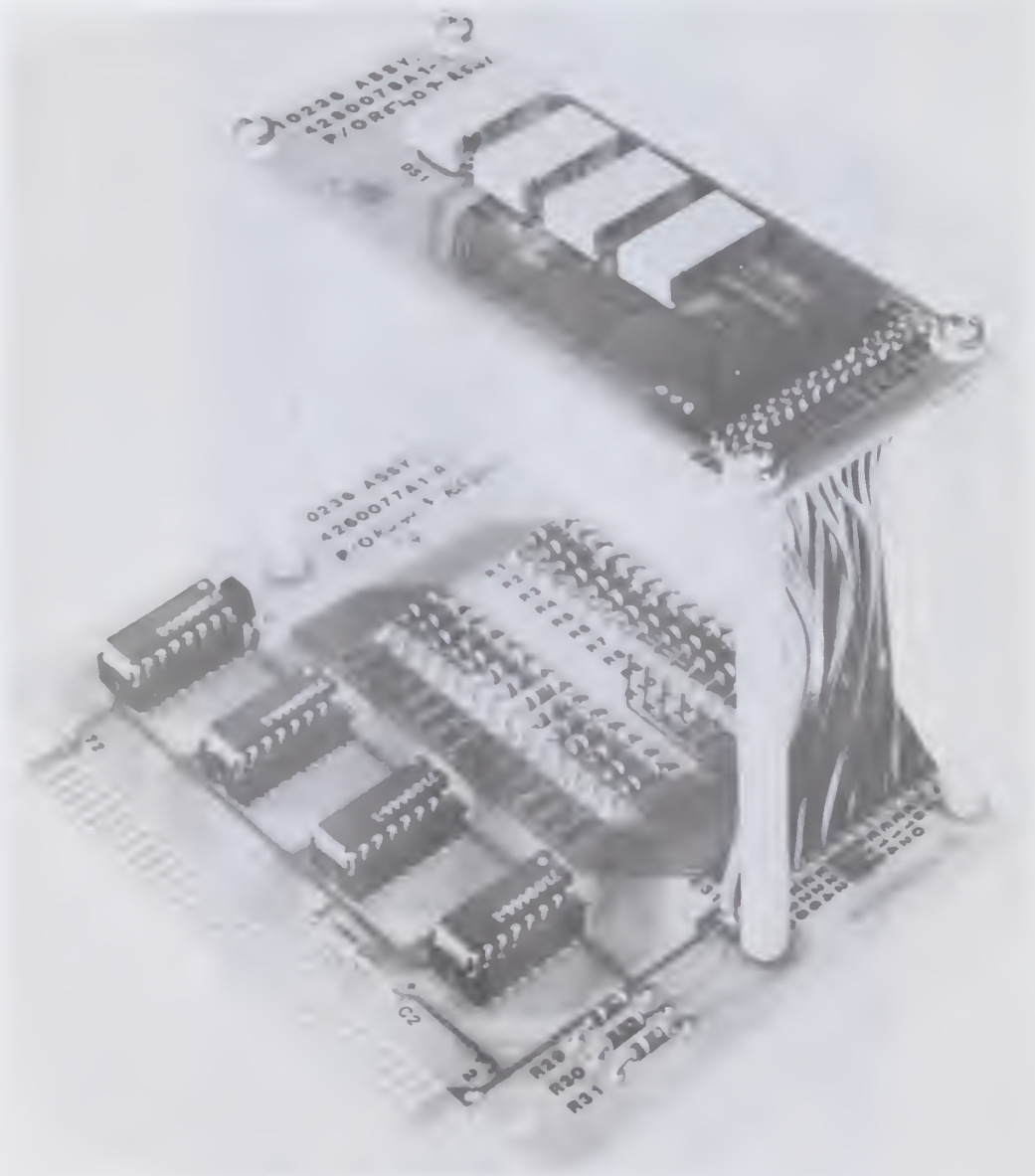


Figure 10-8. Display Mounting Board Assembly, Parts Location (photo)

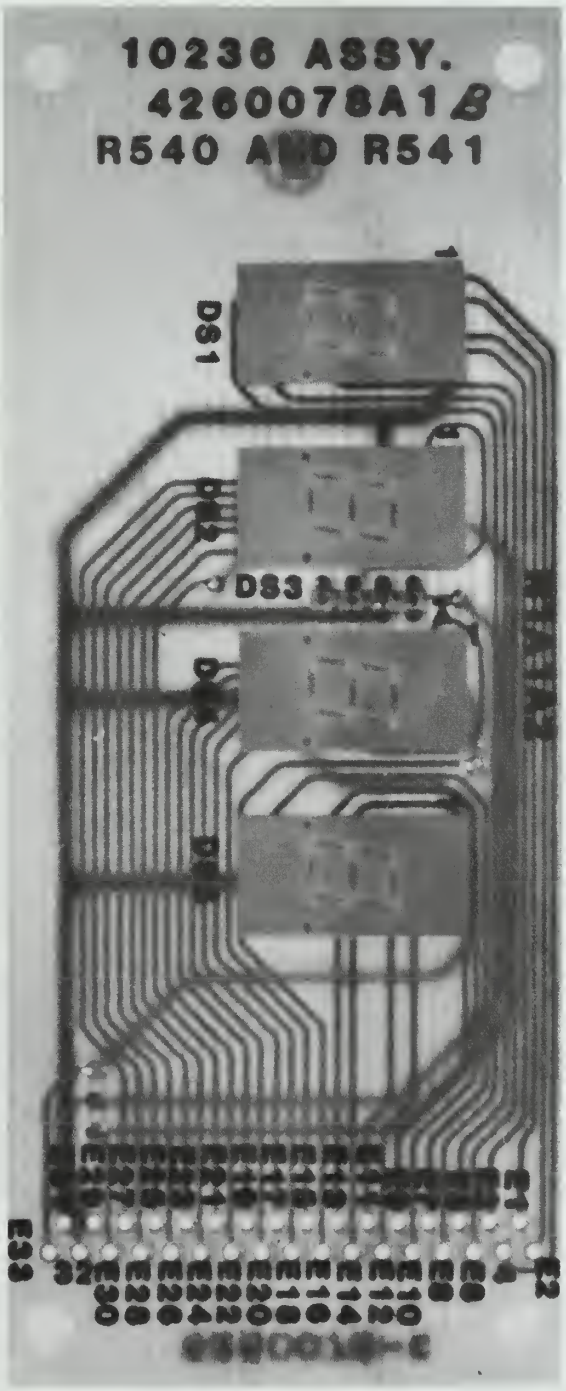


Figure 10-9. Display Mounting Board No. 2 N1A1A2 — Component and Wiring Side

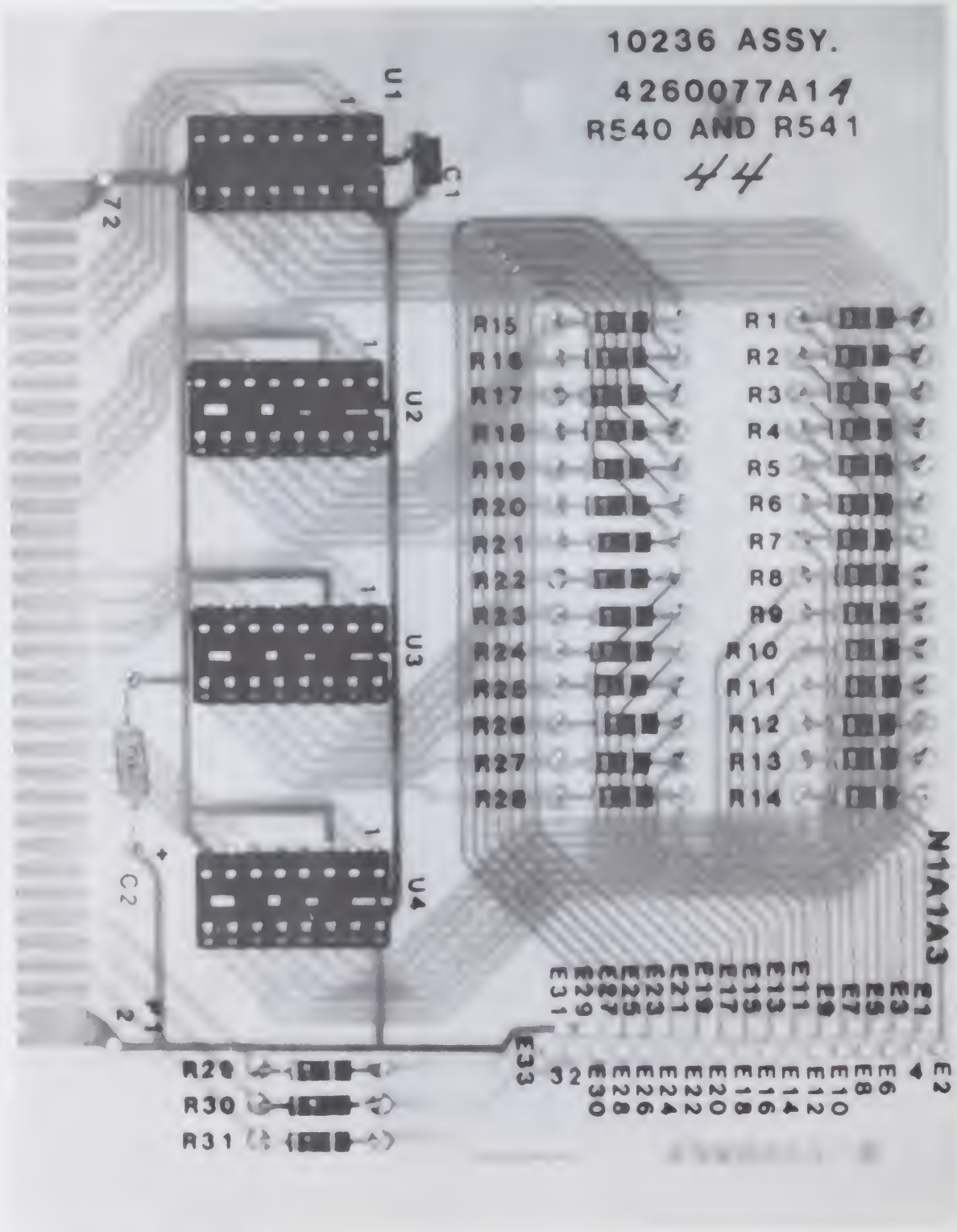


Figure 10-10. Display Mounting Board No. 1 N1A1A3 — Component and Wiring Side

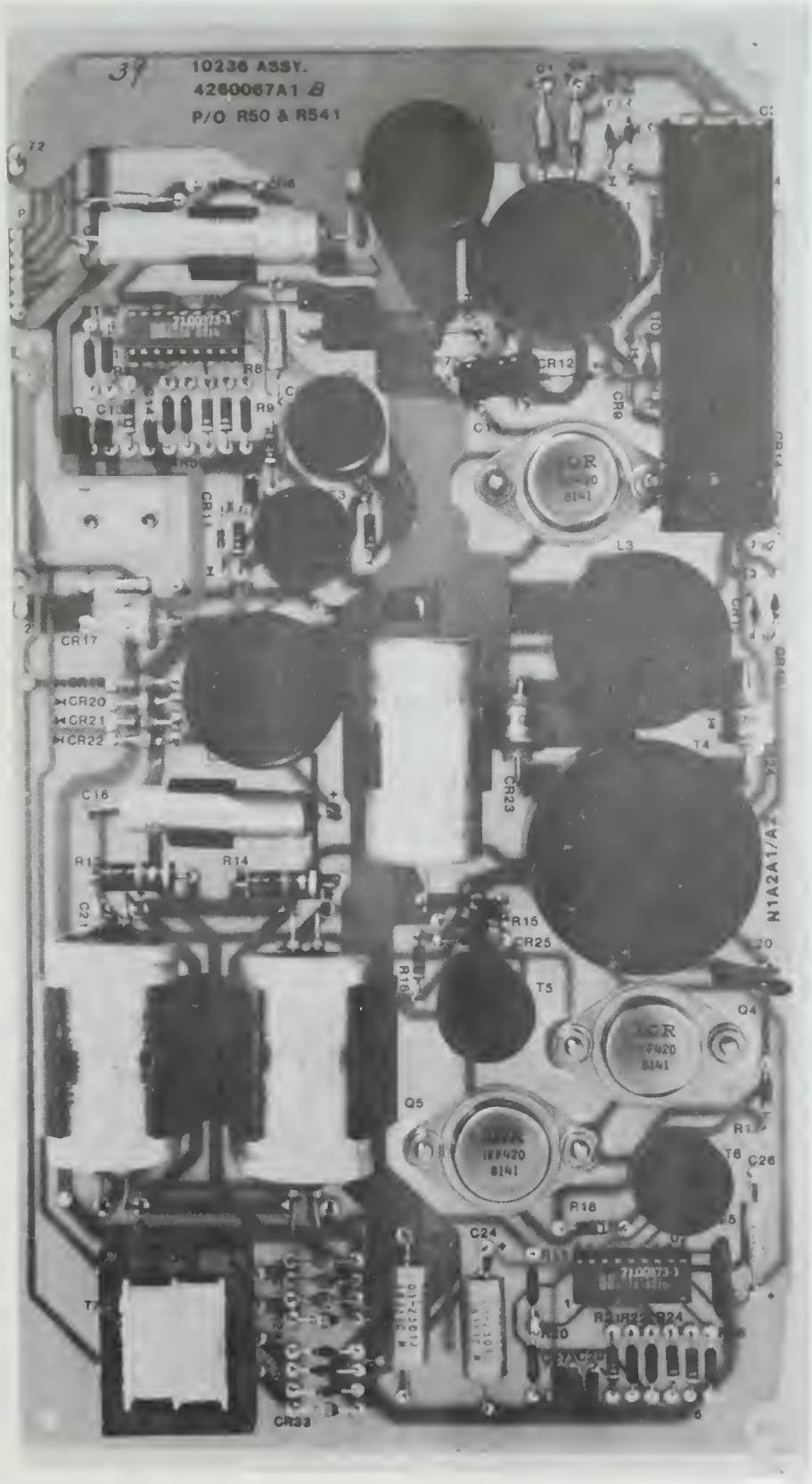


Figure 10-11. Power Supply CCA N1A2A1/A2 — Component and Wiring Side

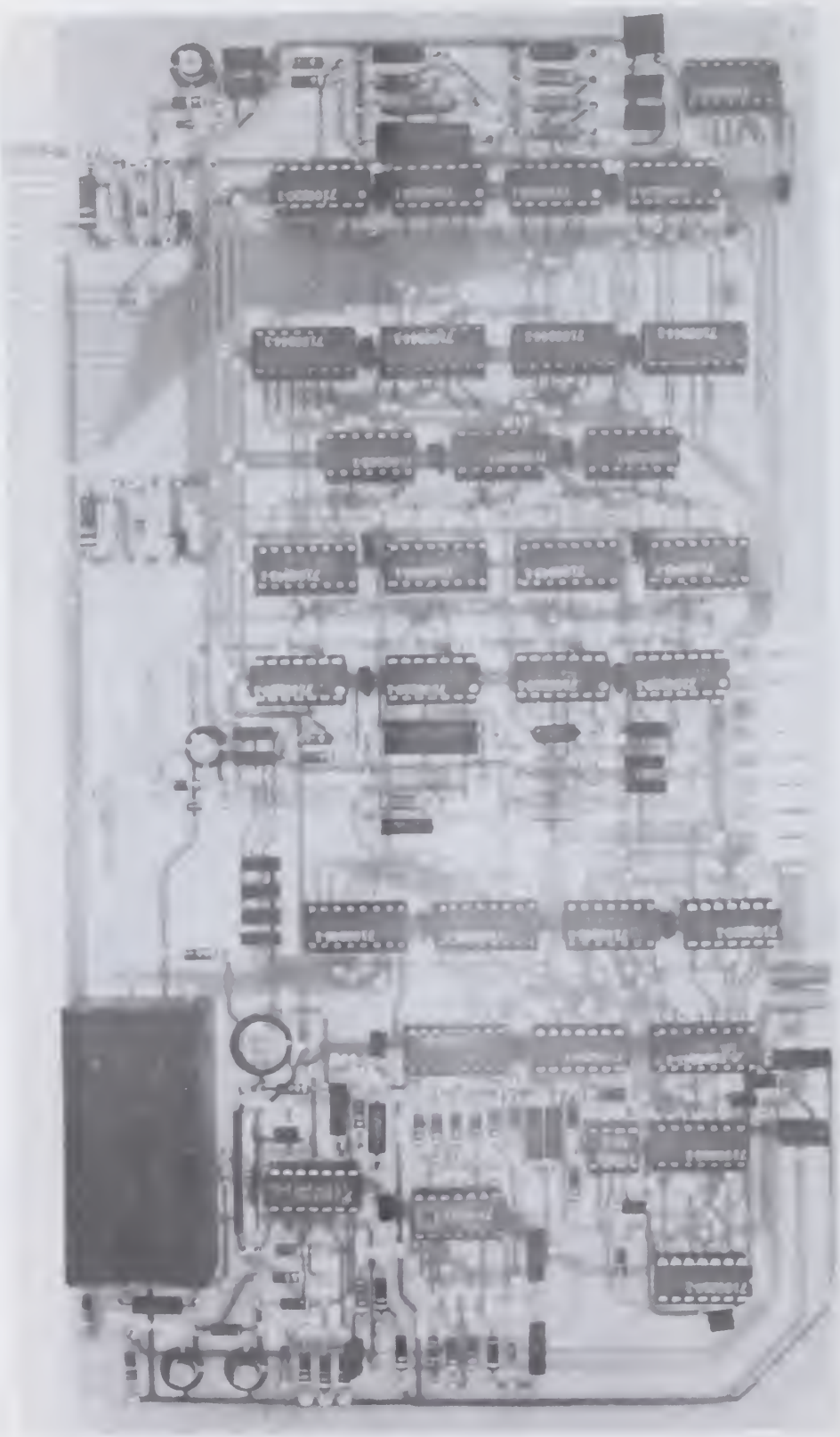


Figure 10-12. Synchro Converter CCA N1A2A3/A4 — Component and Wiring Side (photo)

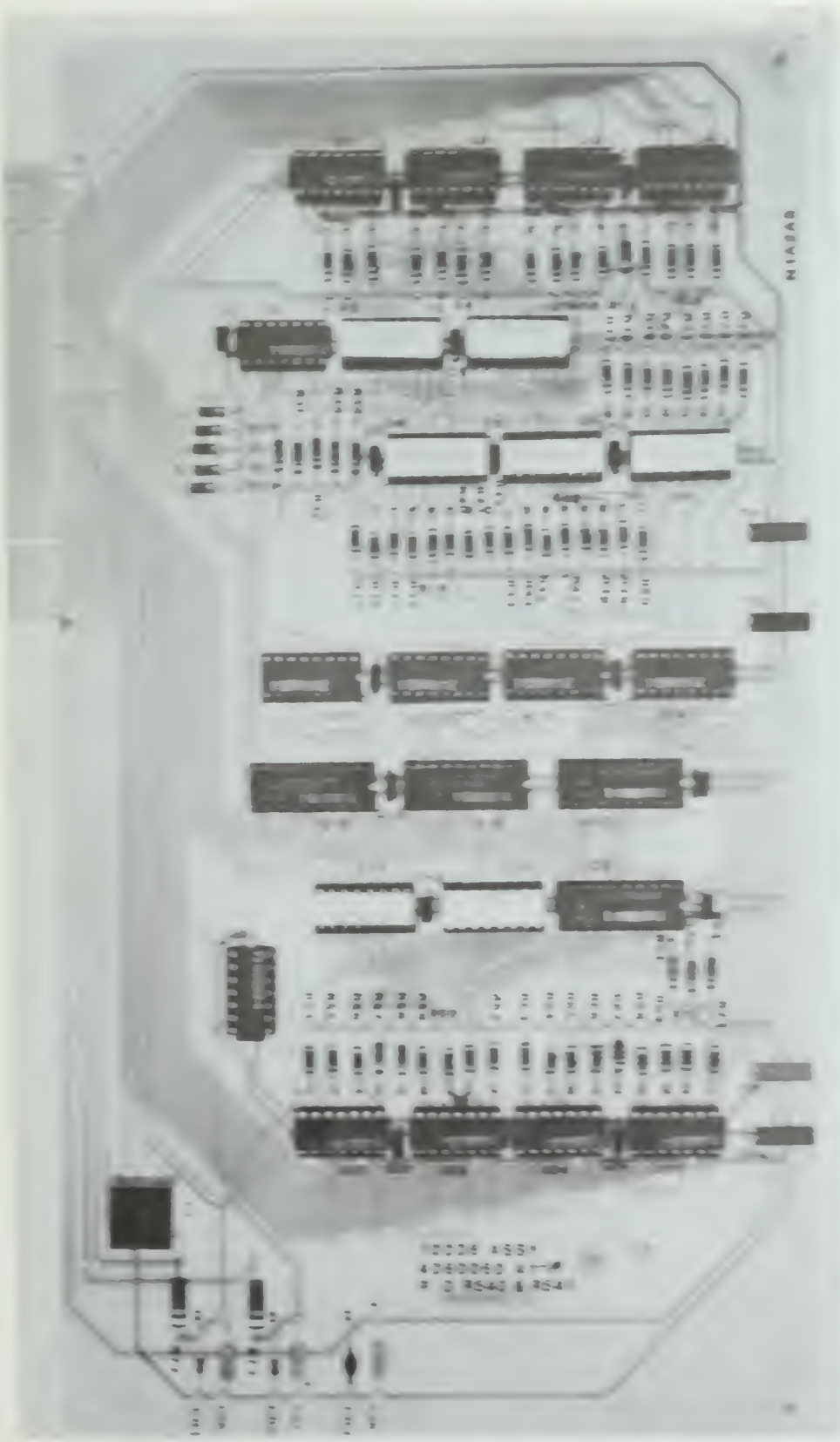


Figure 10-13. Synchro Output CCA N1A2A5 – Component and Wiring Side (photo)

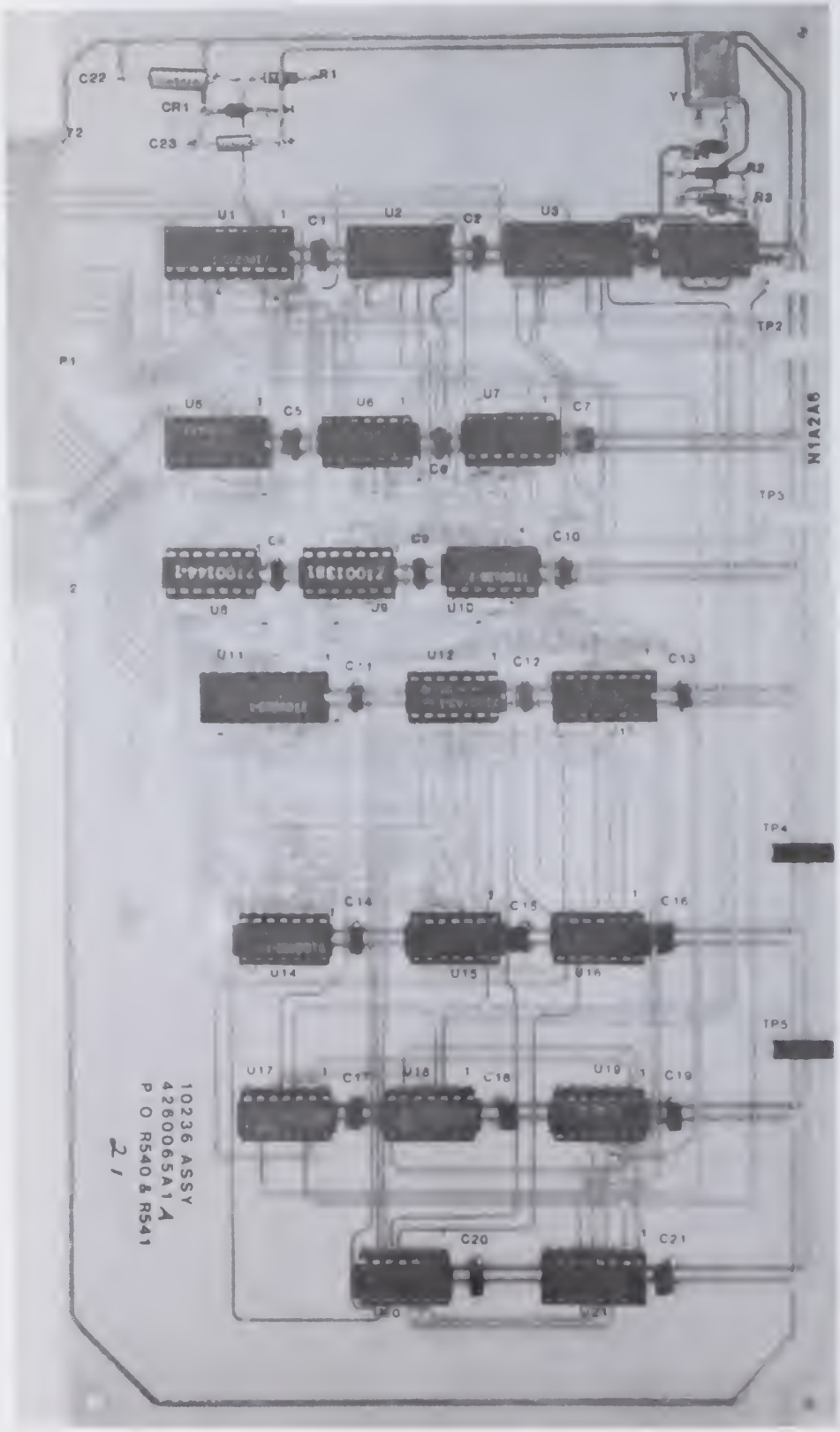


Figure 10-14. DE Receiver CCA N1A2A6 — Component and Wiring Side (photo)

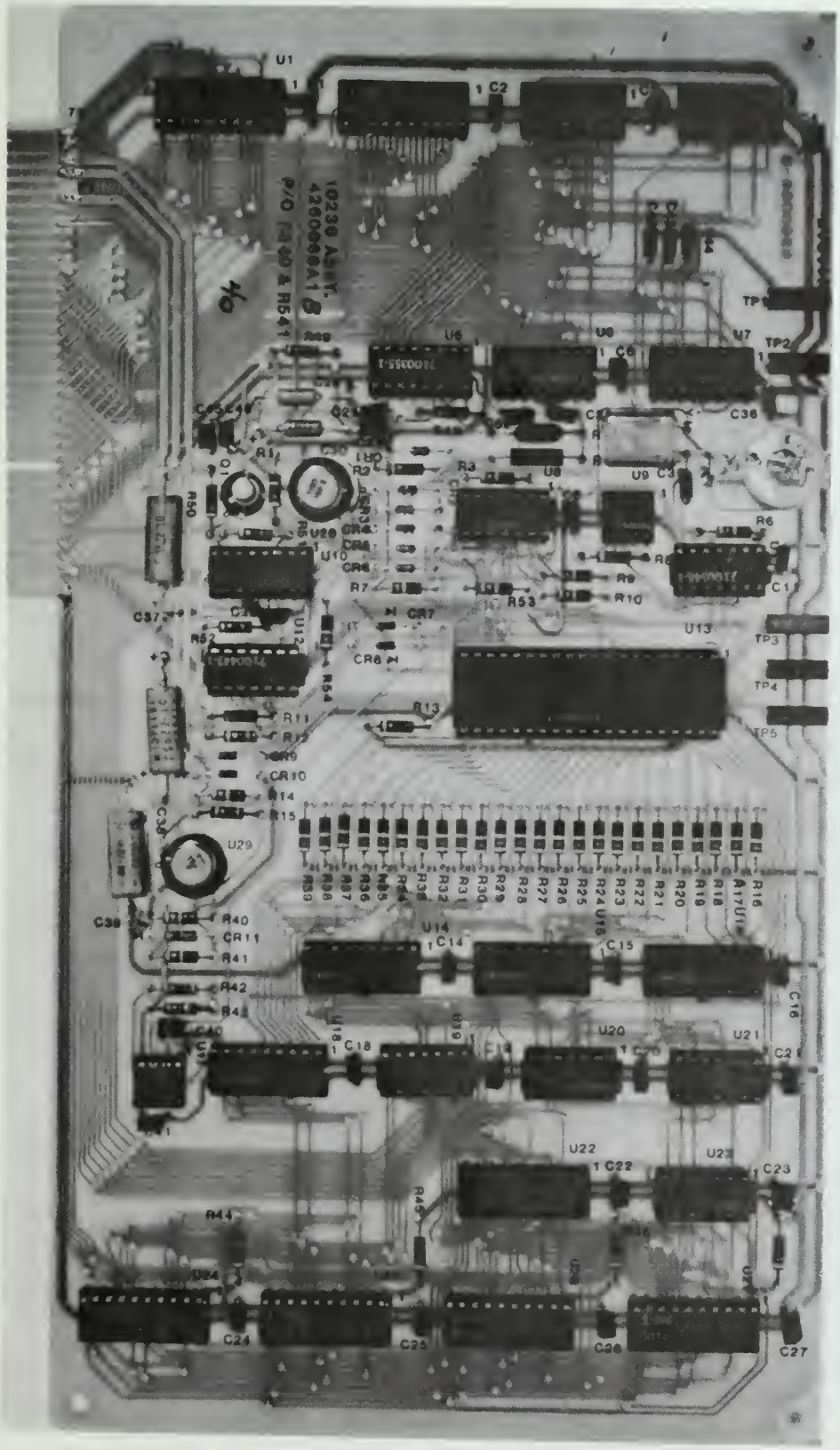


Figure 10-15. Clock/Display CCA N1A2A7 — Component and Wiring Side (photo)

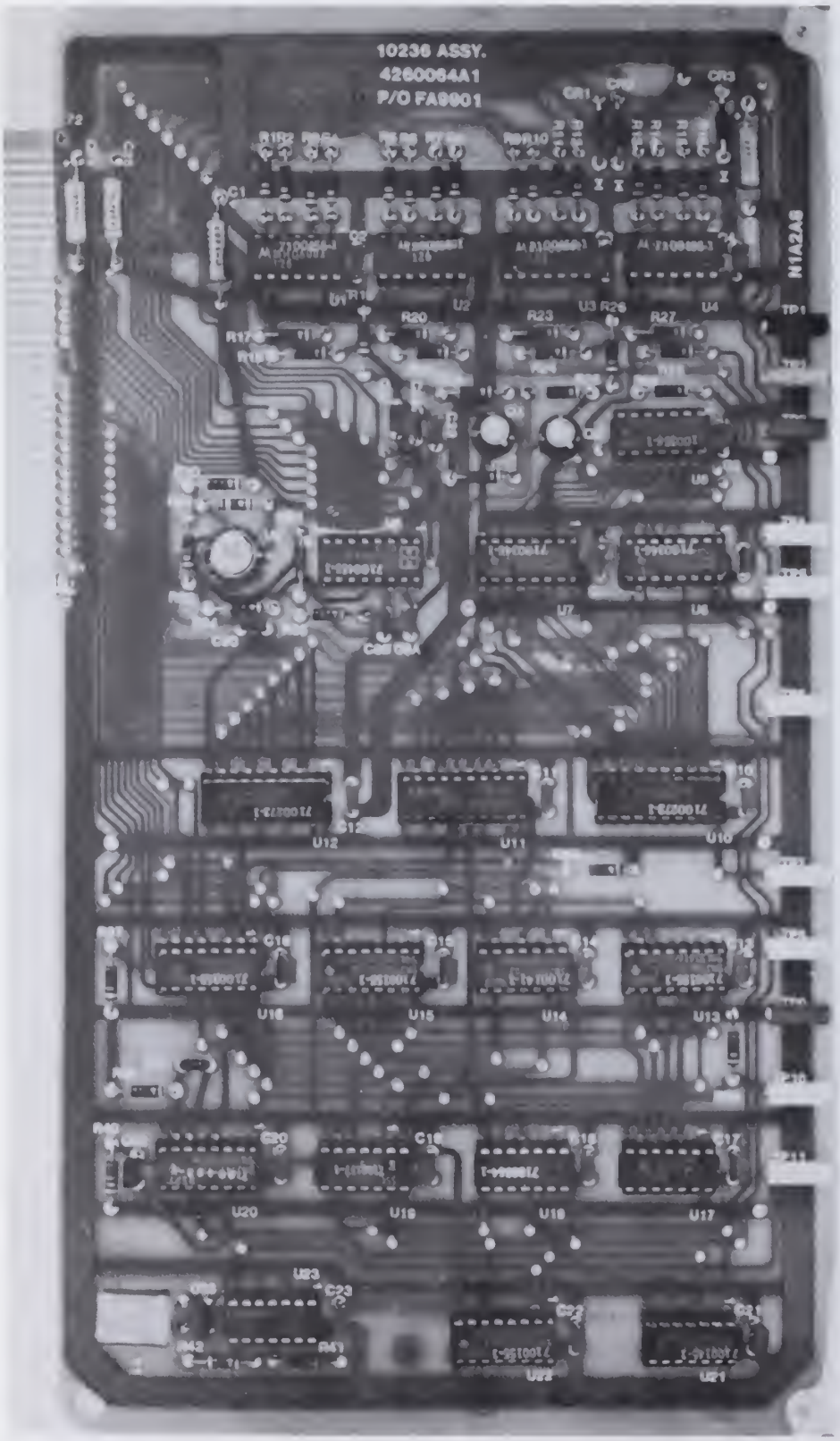


Figure 10-16. DE Transmitter CCA N1A2A8 — Component and Wiring Side (photo)

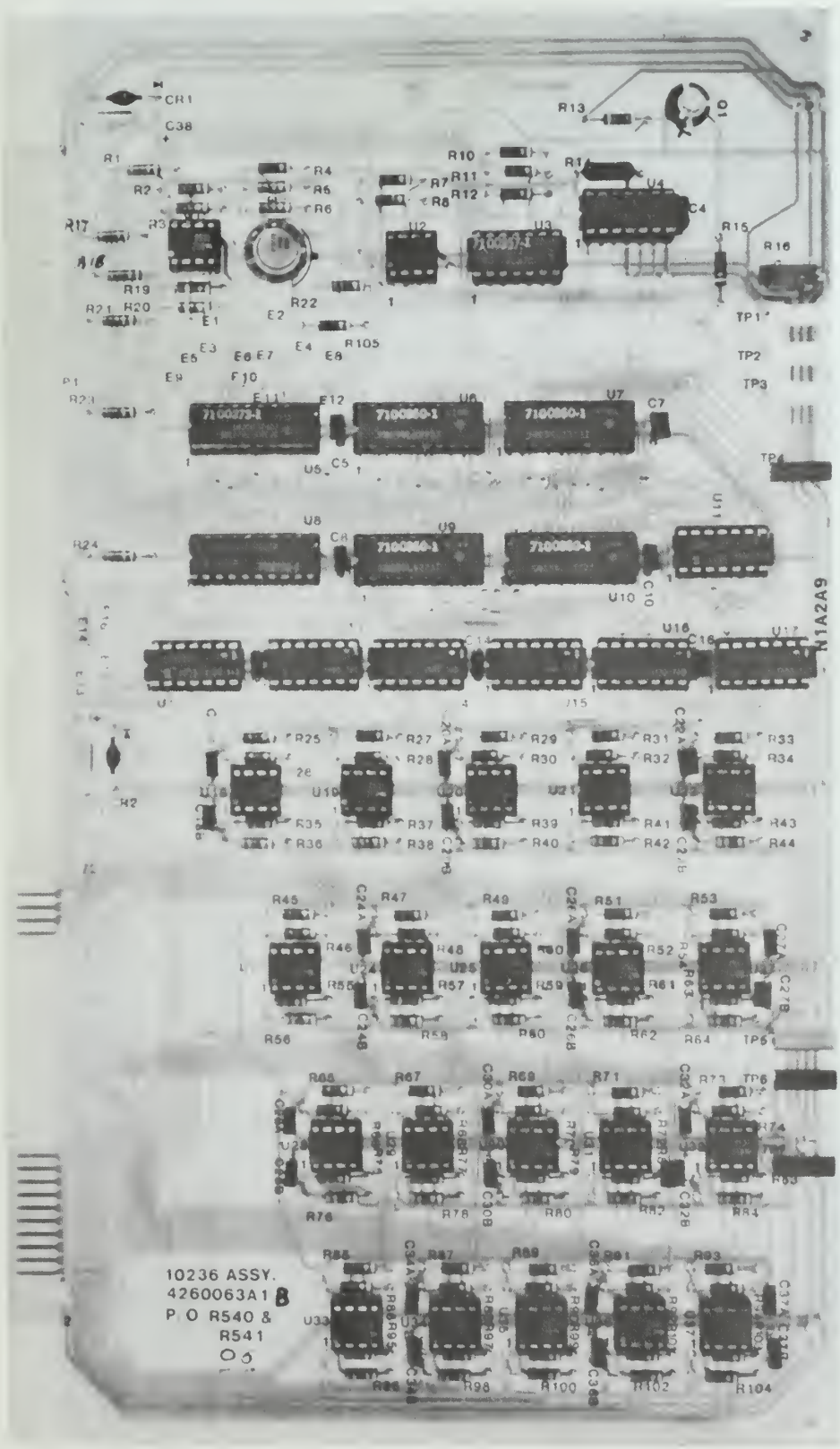


Figure 10-17. Input Buffer CCA N1A2A9 (4620063A1) — Component and Wiring Side

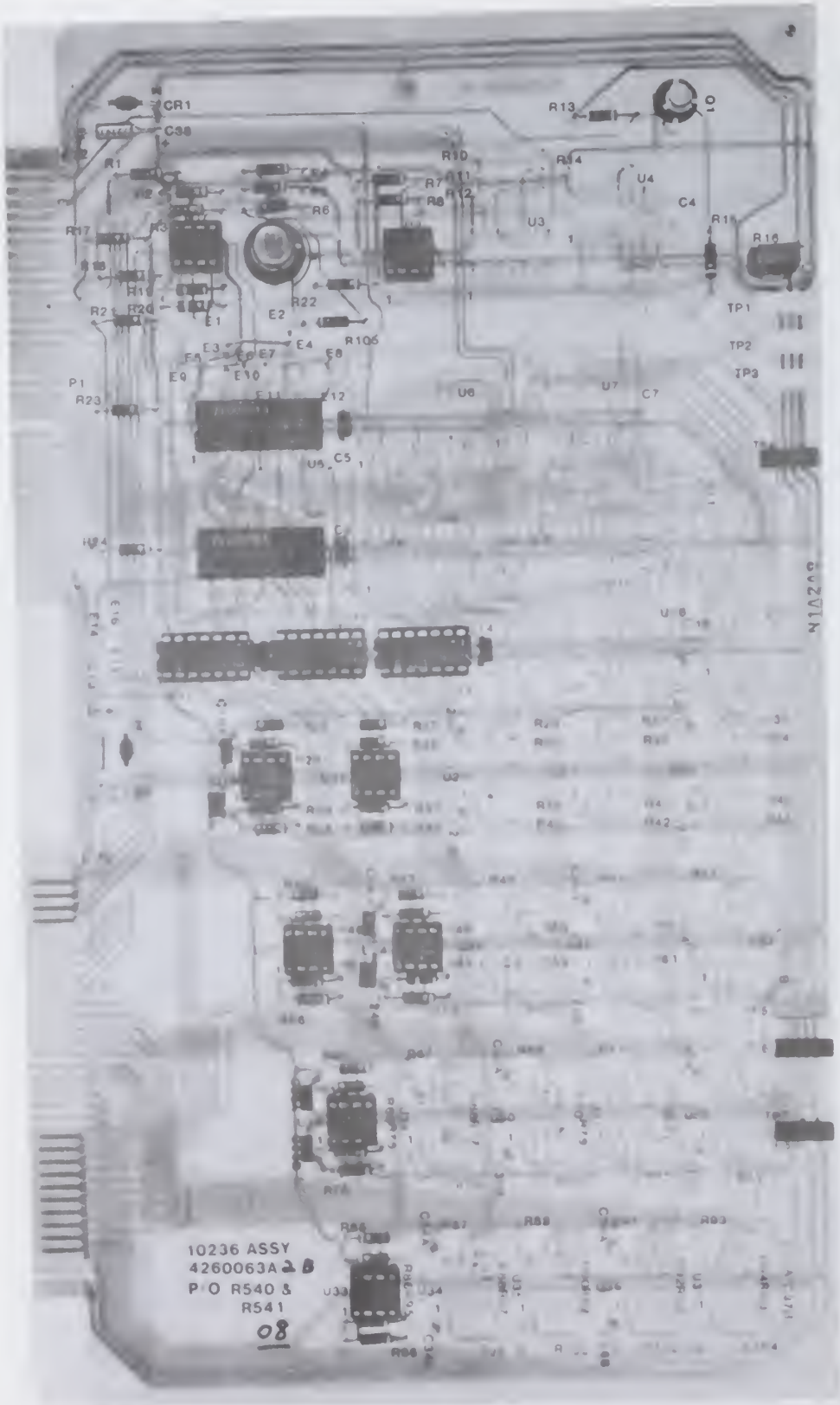


Figure 10-18. Input Buffer CCA N1A2A9 (4260063A2) — Component and Wiring Side

Figure 10-34 provides integrated circuit charts for covering all unique integrated circuits (ICs) used by the RRWDS. These diagrams show the logical function performed by the IC and relate the function to the physical terminals. The following list provides cross-reference between Electrodynamics part numbers to IC type and gives a description of the IC. The number in parentheses in the "IC Type" column is the commonly recognizable number. For example, 8086 is functionally the same as S4151. This IC was assigned the number S4151 because of more rigid testing requirements.

ELECTRODYNAMICS PART NO.	IC TYPE	DESCRIPTION
7040045	HCPL-2531	DUAL OPTOCOUPLER
7100100	SA129 (8085A)	8-BIT CHANNEL MICROPROCESSOR
7100101	SA151 (8086)	16-BIT MICROPROCESSOR
7100103	8212	8-BIT INPUT/OUTPUT PORT
7100104	S4127 (8226)	4-BIT PARALLEL BIDIRECTIONAL BUS DRIVER
7100105	8251A	PROGRAMMABLE COMMUNICATION INTERFACE
7100106	S4130 (8255A)	PROGRAMMABLE PERIPHERAL INTERFACE
7100107	S4146 (8257-5)	PROGRAMMABLE DMA CONTROLLER
7100108	S4153 (8273)	PROGRAMMABLE HDLC/SDLC PROTOCOL CONTROLLER
7100109	S4119 (8279-5)	PROGRAMMABLE KEYBOARD/DISPLAY INTERFACE
7100111	S4121 (8284)	CLOCK GENERATOR AND DRIVER FOR S4151 CPU
7100112	S4122 (8286)	OCTAL BUS TRANSCEIVER
7100113	S4120 (8755A)	16,384-BIT EPROM WITH I/O PORTS
7100114	AM9016DDCB (2117-5)	16-BIT DYNAMIC RAM
7100115	AM9114DDCB	1024 X 4-BIT STATIC RAM (450 NSEC)
7100116	S6553 (2708)	8KμV ERASABLE PROM
7100117	S6554 (2716)	16KμV ERASABLE PROM
7100118	S54S00F (883B)	SCHOTTKY QUAD 2-INPUT POSITIVE NAND GATE
7100120	S54S04F (883B)	SCHOTTKY HEX INVERTER
7100121	S54S08F (883B)	SCHOTTKY QUAD 2-INPUT POSITIVE AND GATE
7100124	F54S30DMQB	SCHOTTKY 8-INPUT POSITIVE NAND GATE
7100125	S54S32F (883B)	SCHOTTKY QUAD 2-INPUT POSITIVE OR GATE
7100126	S54S74F (883B)	SCHOTTKY DUAL D-TYPE EDGE TRIGGERED FLIP-FLOP
7100127	F54S138DMQB	SCHOTTKY 1-OF-8 DECODER/DEMULTIPLEXER

ELECTRODYNAMICS PART NO.	IC TYPE	DESCRIPTION
7100129	S54S151F (883B)	SCHOTTKY 8-BIT MULTIPLEXER
7100131	SNC54S163J	SCHOTTKY SYNCHRONOUS 4-BIT BINARY COUNTER
7100134	SNC54S374J	SCHOTTKY OCTAL D-TYPE FLIP-FLOP (3-STATE)
7100135	S54LS00F (883B)	SCHOTTKY QUAD 2-INPUT POSITIVE NAND GATE
7100136	S54LS02F (883B)	SCHOTTKY QUAD 2-INPUT POSITIVE NOR GATE
7100137	S54LS04F (883B)	SCHOTTKY HEX INVERTER
7100138	S54LS08F (883B)	SCHOTTKY QUAD 2-INPUT POSITIVE AND GATE
7100139	S54LS10F (883B)	SCHOTTKY TRIPLE 3-INPUT POSITIVE NAND GATE
7100140	S54LS14F (883B)	SCHOTTKY HEX SCHMITT TRIGGER INVERTER
7100141	S54LS20F (883B)	SCHOTTKY DUAL 4-INPUT POSITIVE NAND GATE
7100142	S54LS27F (883B)	SCHOTTKY TRIPLE 3-INPUT NOR GATE
7100143	S54LS30F (883B)	SCHOTTKY 8-INPUT POSITIVE NAND GATE
7100144	S54LS32F (883B)	SCHOTTKY QUAD 2-INPUT POSITIVE OR GATE
7100145	S54LS74F (883B)	SCHOTTKY DUAL D-TYPE EDGE TRIGGERED FLIP-FLOP
7100146	S54LS85F (883B)	SCHOTTKY 4-BIT MAGNITUDE COMPARATOR
7100147	DM54LS86J (883B)	SCHOTTKY QUAD 2-INPUT EXCLUSIVE OR GATE
7100149	S54LS109F (883B)	SCHOTTKY DUAL J-K POSITIVE EDGE-TRIGGERED FLIP-FLOP
7100150	4260033 (54LS123)	RETRIGGERABLE MONOSTABLE MULTI-VIBRATOR
7100151	S54LS125F (883B)	SCHOTTKY QUAD BUS BUFFER GATE WITH 3-STATE OUTPUTS
7100153	DM54LS139J (883B)	SCHOTTKY DUAL 1-OF-4 DECODER/DEMULTI-PLEXER
7100154	S54LS155F (883B)	SCHOTTKY DUAL 2-LINE TO 4-LINE DECODER/DE-MULTIPLEXER
7100155	S54LS161F (883B)	SCHOTTKY 4-BIT BINARY COUNTER

ELECTRODYNAMICS PART NO.	IC TYPE	DESCRIPTION
7100344	CD40192BF/3	COMOS SYNCHRONOUS 4-BIT UP/DOWN DECADE COUNTER
7100345	CD4001BF/3	QUAD 2-INPUT NOR GATE
7100346	SNC54LS	PARALLEL-LOAD 8-BIT SHIFT REGISTER
7100348	CD4052B/F	DUAL4-BIT CHANNEL MULTIPLEXER/DEMULTIPLEXER
7100350	HM17602B-8	BIPOLAR 32 X 8 PROM
7100351	LM124	QUAD OPERATIONAL AMPLIFIER
7100352	MC14560-BBEBS	CMOS ADDER
7100355	DAC-08A08	8-BIT HIGH SPEED MULTIPLE DIGITAL-TO-ANALOG CONVERTER
7100356-1	4260015 (54LS280)	9-BIT ODD/EVEN PARITY GENERATOR/CHECKER
7100357	SNC5407	HEX BUFFER DRIVER
7100358	54LS251F	DATA SELECTOR/MULTIPLEXER
7100360-1	4260016 (54LS373)	OCTAL D-TYPE TRANSPARENT LATCHES AND AND EDGE TRIGGERED FLIP-FLOPS
7100363	SNC5445J	BCD DECODER
7100364-1	4260016 (54LS132)	QUADRUPLE 2-INPUT POSITIVE NAND SCHMITT TRIGGER
7100370	LM117K	ADJUSTABLE VOLTAGE REGULATOR
7100371	μA7812H	VOLTAGE REGULATOR, +12V, 0.5A
7100372	CD40193BF/3	SYNC, 4-BIT UP/DOWN DECADE COUNTER
7100373	34333(SG1526) MM5369	REGULATING PULSE WIDTH MODULATOR
7100442	S544SF(883B)	4-LINE TO 10-LINE DECODER
7100443	CD4071B	QUAD 2-INPUT OR GATE
7100444	9370	7-SEGMENT DECODER/DRIVER
7100445	MM7317N	ALARM CLOCK CALCULATOR

ELECTRODYNAMICS PART NO.	IC TYPE	DESCRIPTION
7100159	μAF111HMQB	VOLTAGE COMPARATOR
7100169	μA741DMQB	OPERATIONAL AMPLIFIER
7100202	CD4069UBMJ (883B)	HEX INVERTER
7100215	MM5369AA/N	OSCILLATOR PRESCALER, 3.58 MHz to 60 Hz
7100218	S54LS164F (883B)	SCHOTTKY 8-BIT SERIAL-M-PARALLEL-OUT SHIFT REGISTER
7100223	DM54S373J (883B)	OCTAL D TYPE LATCH
7100225	S54LS21F (883B)	DUAL 4-INPUT POSITIVE AND GATE
7100231	S5425174F (883B)	SCHOTTKY HEX D FLIP—FLOP
7100250	MC14011BBCBS	CMOS QUAD 2-INPUT NAND GATE
7100251	MC14013BBCBS	CMOS DUAL D-TYPE FLIP FLOP
7100268	DM54LS244J (883B)	SCHOTTKY OCTAL BUFFER (3-STATE)
7100273	S54LS240F (883B)	SCHOTTKY OCTAL INVERTER BUFFER (3-STATE)
7100291	FμA148DMQB	QUAD 741 OPERATIONAL AMPLIFIER
7100292	ZM555DE(883B)	TIMER
7100318	S54121F(883B)	MONOSTABLE MULTIVIBRATOR
7100320	CD4062B	QUAD BI-LATERAL SWITCH
7100336	CD002BF(3)	CMOS DUAL 4-INPUT NOR GATE
7100339	CD4028BF(3)	CMOS BCD-TO-DECIMAL DECODER
7100341	CD4027B	DUAL J-K MASTER/SLAVE WITH SET AND RESET
7100342	OP-05-883J	OPERATIONAL AMPLIFIER
7100343	CD4008	4-BIT ADDER

ELECTRODYNAMICS PART NO.	IC TYPE	DESCRIPTION
7100446	MM54C915	7-SEGMENT TO BCD CONVERTER
7100452	LM320H-12	VOLTAGE REGUALTOR, -12V, 0.5A
7100453	SNJ54123J	MONOSTABLE MULTIVIBRATOR
7100454	μA760HM2B	VOLTAGE COMPARATOR
7100455	H1-1818A2	CMOS ANALOG MULTIPLEXER
7100456	MHQ6001	QUAD DUAL INPUT TRANSISTOR
7100459	SNJ54S280J	PARITY GENERATOR
7230023	HDSP-3531	SEVEN-SEGMENT DISPLAY

WIRE NO.	WIRE AWG	COLOR	APPROX. LENGTH	FROM	TERM ITEM	TO	TERM ITEM	REMARKS
1	22	R	29''	N1A1 XA1(1)	—	N1N2 P1(31)	—	
2	22	●	22''	N1A1 XA1(1)	—	N1A1 S4(DK4)(1)	—	
3	22	O	22''	N1A1 XA1(9)	—	N1A1 S4(DK4)(3)	—	
4	22	BR	22''	N1A1 XA1(11)	—	N1A1 S4(DK4)(4)	—	
5	22	V/Y	25''	N1A1 XA1(21)	—	N1N2 P1(28)	—	
6	22	Y/G	29''	N1A1 XA1(23)	—	N1N2 P1(13)	—	
7	22	GY/W	29''	N1A1 XA1(25)	—	N1N2 P1(29)	—	
8	22	BK/O	29''	N1A1 XA1(27)	—	N1N2 P1(12)	—	
9	22	V/W	29''	N1A1 XA1(33)	—	N1N2 P1(4)	—	
10	22	O/G	29''	N1A1 XA1(35)	—	N1N2 P1(19)	—	
11	22	V/BL	29''	N1A1 XA1(37)	—	N1N2 P1(3)	—	
12	22	Y/BL	29''	N1A1 XA1(39)	—	N1N2 P1(20)	—	
13	22	R/Y	29''	N1A1 XA1(45)	—	N1N2 P1(6)	—	
14	22	O/BL	29''	N1A1 XA1(47)	—	N1N2 P1(21)	—	
15	22	Y/W	29''	N1A1 XA1(49)	—	N1N2 P1(5)	—	
16	22	BL/Y	29''	N1A1 XA1(51)	—	N1N2 P1(22)	—	
17	22	V/O	29''	N1A1 XA1(57)	—	N1N2 P1(8)	—	
18	22	Y/O	29''	N1A1 XA1(59)	—	N1N2 P1(23)	—	
19	22	R/BL	29''	N1A1 XA1(61)	1	N1N2 P1(7)	—	
20	22	R/W	29''	N1A1 XA1(63)	—	N1N2 P1(24)	—	
21	22	BK	29''	N1A1 XA1(72)	—	N1N2 P1(47)	—	
22	22	BK	8''	N1A1 XDS1(2)	—	N1A1 XDS5(2)	—	

Figure 10-31. Control Panel to Chassis Interconnecting Wiring List (Sheet 1 of 6)

WIRE NO.	WIRE AWG	COLOR	APPROX. LENGTH	FROM	TERM ITEM	TO	TERM ITEM	REMARKS
23	22	BK	7''	N1A1 XDS5(2)	—	N1A1 XDS7(2)	—	
24	22	BK	9''	N1A1 XDS2(2)	—	N1A1 XDS6(2)	—	
25	22	BK	8''	N1A1 XDS6(2)	—	N1A1 XDS8(2)	—	
26	22	BK	7''	N1A1 XDS8(2)	—	N1A1 XDS7(2)	—	
27	22	BK	37''	N1A1 XDS1(2)	—	N1N2 P1(40)	—	
28	22	W/BK	7''	N1A1 XDS3(2)	—	N1A1 XDS4(2)	—	
29	22	W/BK	34''	N1A1 XDS4(2)	—	N1N2 P1(50)	—	
30	22	BK	16''	N1A1A1 TB1(2)	5	N1A1 XDS2(2)	—	
31	22	W/BK	6''	N1A1 S5(1)	—	N1A1 S6(1)	—	
32	22	W/BK	7''	N1A1 S6(1)	—	N1A1 S3(18)	—	
33	22	BL	13''	N1A1 XDS10(1)	—	N1A1A1 TB1(2)	5	
34	22	O	13''	N1A1 XDS10(2)	—	N1A1A1 TB1(3)	5	
35	22	BR	8''	N1A1 T1(3)	—	N1A1A1 TB1(6)	5	
36	22	W	8''	N1A1 T1(5)	—	N1A1A1 TB1(7)	5	
37	22	O	8''	N1A1 U1(0)	—	N1A1A1 TB1(3)	5	
38	22	G	8''	N1A1 U1(1)	—	N1A1A1 TB1(4)	5	
39	22	GY	8''	N1A1 U1(2)	—	N1A1A1 TB1(5)	5	
40	22	Y/G	21''	N1A1 S5(2)	—	N1N2 P1(9)	—	
41	22	Y/BL	21''	N1A1 S6(2)	—	N1N2 P1(26)	—	
42	22	BARE	1½''	N1A1 S4(DK1)(1)	—	N1A1 S4(DK1)(3)	—	
43	22	BARE	1½''	N1A1 S4(DK1)(3)	—	N1A1 S4(DK1)(5)	—	
44	22	BARE	1½''	N1A1 S4(DK1)(2)	—	N1A1 S4(DK1)(4)	—	

Figure 10-31. Control Panel to Chassis Interconnecting Wiring List (Sheet 2 of 6)

WIRE NO.	WIRE AWG	COLOR	APPROX. LENGTH	FROM	TERM ITEM	TO	TERM ITEM	REMARKS
45	22	BARE	1¾''	N1A1 S4(DK2)(1)	—	N1A1 S4(DK2)(4)	—	
46	22	BARE	1''	N1A1 S4(DK2)(4)	—	N1A1 S4(DK2)(5)	—	
47	22	BARE	1''	N1A1 S4(DK2)(2)	—	N1A1 S4(DK2)(3)	—	
48	22	BARE	1''	N1A1 S4(DK3)(2)	—	N1A1 S4(DK3)(3)	—	
49	22	BARE	1''	N1A1 S4(DK3)(3)	—	N1A1 S4(DK3)(4)	—	
50	22	BARE	1''	N1A1 S4(DK3)(4)	—	N1A1 S4(DK3)(5)	—	
51	22	BARE	1''	N1A1 S4(DK4)(4)	—	N1A1 S4(DK4)(5)	—	
52	22	BARE	1¾''	N1A1 S4(DK1)(5)	—	N1A1 S4(DK2)(5)	—	
53	22	BARE	1¾''	N1A1 S4(DK2)(5)	—	N1A1 S4(DK3)(4)	—	
54	22	BARE	1½''	N1A1 S4(DK1)(4)	—	N1A1 S4(DK2)(3)	—	
55	22	BARE	1¾''	N1A1 S4(DK2)(2)	—	N1A1 S4(DK3)(1)	—	
56	22	BARE	1¾''	N1A1 S4(DK3)(4)	—	N1A1 S4 (DK4)(COM)	—	
57	22	Y/W/R	21''	N1A1 S4 (DK1)(COM)	—	N1N2 P1(10)	—	
58	22	O/W/R	21''	N1A1 S4 (DK2)(COM)	—	N1N2 P1(27)	—	
59	22	V/W/R	21''	N1A1 S4 (DK3)(COM)	—	N1N2 P1(11)	—	
60	22	R	21''	N1A1 S5(DK1)(4)	—	N1N2 P1(30)	—	
61	22	BK	7''	N1A1 S4(DK1)(1)	—	N1A1 S2(DK1)(1)	—	
62	22	R	7''	N1A1 S4(DK1)(2)	—	N1A1 S2(DK1)(2)	—	
63	22	BK	21''	N1A1 S4(DK1)(3)	—	N1N2 P1(32)	—	
64	22	BARE	1½''	N1A1 S2(DK1)(1)	—	N1A1 S2(DK1)(3)	—	
65	22	BARE	1½''	N1A1 S2(DK1)(3)	--	N1A1 S2(DK1)(5)	—	
66	22	BARE	1½''	N1A1 S2(DK1)(5)	—	N1A1 S2(DK1)(7)	—	

Figure 10-31. Control Panel to Chassis Interconnecting Wiring List (Sheet 3 of 6)

WIRE NO.	WIRE AWG	COLOR	APPROX. LENGTH	FROM	TERM ITEM	TO	TERM ITEM	REMARKS
67	22	BARE	1½''	N1A1 S2(DK1)(2)	—	N1A1 S2(DK1)(4)	—	
68	22	BARE	1½''	N1A1 S2(DK1)(4)	—	N1A1 S2(DK1)(6)	—	
69	22	BARE	1½''	N1A1 S2(DK1)(6)	—	N1A1 S2(DK1)(8)	—	
70	22	BARE	1''	N1A1 S2(DK2)(1)	—	N1A1 S2(DK2)(2)	—	
71	22	BARE	1¾''	N1A1 S2(DK2)(2)	—	N1A1 S2(DK2)(5)	—	
72	22	BARE	1''	N1A1 S2(DK2)(5)	—	N1A1 S2(DK2)(6)	—	
73	22	BARE	1''	N1A1 S2(DK2)(3)	—	N1A1 S2(DK2)(4)	—	
74	22	BARE	1¾''	N1A1 S2(DK2)(4)	—	N1A1 S2(DK2)(7)	—	
75	22	BARE	1''	N1A1 S2(DK2)(7)	—	N1A1 S2(DK2)(8)	—	
76	22	BARE	1''	N1A1 S2(DK3)(1)	—	N1A1 S2(DK3)(2)	—	
77	22	BARE	1''	N1A1 S2(DK3)(2)	—	N1A1 S2(DK3)(3)	—	
78	22	BARE	1''	N1A1 S2(DK3)(3)	—	N1A1 S2(DK3)(4)	—	
79	22	BARE	1''	N1A1 S2(DK3)(5)	—	N1A1 S2(DK3)(6)	—	
80	22	BARE	1''	N1A1 S2(DK3)(6)	—	N1A1 S2(DK3)(7)	—	
81	22	BARE	1''	N1A1 S2(DK3)(7)	—	N1A1 S2(DK3)(8)	—	
82	22	BARE	1¾''	N1A1 S2(DK1)(8)	—	N1A1 S2(DK2)(8)	—	
83	22	BARE	1¾''	N1A1 S2(DK2)(8)	—	N1A1 S2(DK3)(8)	—	
84	22	BARE	1¾''	N1A1 S2(DK1)(7)	—	N1A1 S2(DK2)(6)	—	
85	22	BARE	1¾''	N1A1 S2(DK2)(6)	—	N1A1 S2(DK3)(4)	—	
86	22	R/Y	25''	N1A1 S2 (DK1)(COM)	—	N1N2 P1(44)	—	
87	22	R/W	26''	N1A1 S2 (DK2)(COM)	—	N1N2 P1(45)	—	
88	22	R/BL	27''	N1A1 S2 (DK3)(COM)	—	N1N2 P1(46)	—	

Figure 10-31. Control Panel to Chassis Interconnecting Wiring List (Sheet 4 of 6)

WIRE NO.	WIRE AWG	COLOR	APPROX. LENGTH	FROM	TERM ITEM	TO	TERM ITEM	REMARKS
89	22	BARE	1''	N1A1 (S3)(1)	—	N1A1 S3(2)	—	
90	22	BARE	1''	N1A1 S3(3)	—	N1A1 S3(4)	—	
91	22	BARE	1½''	N1A1 S3(7)	—	N1A1 S3(9)	—	
92	22	BARE	1½''	N1A1 S3(8)	—	N1A1 S3(10)	—	
93	22	BARE	1''	N1A1 S3(14)	—	N1A1 S3(15)	—	
94	22	BARE	1''	N1A1 S3(15)	—	N1A1 S3(16)	—	
95	22	BARE	3''	N1A1 S3(1)	—	N1A1 S3(7)	—	
96	22	BARE	2''	N1A1 S3(4)	—	N1A1 S3(8)	—	
97	22	BARE	2''	N1A1 S3(10)	—	N1A1 S3(14)	—	
98	22	V	23''	N1A1 S3(16)	—	N1N2 P1(16)	—	
93	22	O	23''	N1A1 S3(12)	—	N1N2 P1(43)	—	
100	22	G	23''	N1A1 S3(6)	—	N1N2 P1(25)	—	
101	22	BL	8''	N1A1 S3(1)	—	N1A1 XDS10(1)	—	
102	16	GY	7½''	N1A1 S1(3)	—	N1A1 XF2(1)	—	
103	16	GY	7½''	N1A1 XF1(1)	—	N1A1 XF2(1)	—	
104	—	—	—	N1A1 XF1(1)	—	N1A1 XDS9(2)	—	
105	18	W/GY	38''	N1A1 S1(6)	—	N1N2 TB1(3)	5	
106	20	W/GY	3½''	N1A1 S1(6)	—	N1A1 XDS9(1)	—	
107	18	GY	39''	N1A1 XF1(2)	—	N1N2 TB1(4)	5	
108	18	GY	38''	N1A1 XF2(2)	—	N1N2 TB1(2)	5	
109	20	GY	20''	N1A1 S1(2)	—	N1A1 T1(1)	—	
110	20	W/GY	20''	N1A1 S1(5)	—	N1A1 T1(2)	—	

Figure 10-31. Control Panel to Chassis Interconnecting Wiring List (Sheet 5 of 6)

WIRE NO.	WIRE AWG	COLOR	APPROX. LENGTH	FROM	TERM ITEM	TO	TERM ITEM	REMARKS
111	22	W/BR	33''	N1A1 XDS6(1)	—	N1N2 P1(31)	—	
112	22	W/R	33''	N1A1 XDS5(1)	—	N1N2 P1(35)	—	
113	22	W/O	32''	N1A1 XDS7(1)	—	N1N2 P1(36)	—	
114	22	W/BL	34''	N1A1 XDS3(1)	—	N1N2 P1(37)	—	
115	22	W/GY	35''	N1A1 XDS1(1)	—	N1N2 P1(38)	—	
116	COAX. CABLE	BK	20''	N1A1 J2(1)(GND)	—	N1N2 P1(48)	—	
117	COAX. CABLE	BK	19''	N1A1 J1(1)(GND)	—	N1N2 P1(49)	—	
118	22	W/Y	35''	N1A1 XDS2(1)	—	N1N2 P1(18)	—	
119	22	V/Y	34''	N1A1A1 TB1(1)	5	N1N2 P1(33)	—	
120	22	W/GY	34''	N1A1 XDS4(1)	—	N1N2 P1(2)	—	
121	COAX. CABLE	BK	—	N1A1 J2(2)(CTR)	—	N1N2 P1(15)	—	
122	COAX. CABLE	BK	—	N1A1 J1(2)(CTR)	—	N1N2 P1(17)	—	
123	22	R	5''	N1A1 BT1(+)	—	N1A1A1 TB1(1)	5	
124	22	BK	5''	N1A1 BT1(−)	—	N1A1A1 TB1(2)	5	
125	22	W/V	55''	N1A1 XDS8(1)	—	N1N2 P1(1)		−12V. IND.

Figure 10-31. Control Panel to Chassis Interconnecting Wiring List (Sheet 6 of 6)

WIRE NO.	WIRE AWG	COLOR	APPROX. LENGTH	FROM	TERM ITEM	TO	TERM ITEM	REMARKS
1	22	W/BR/ G/BK	40''	N1A3 J13(g)	—	N1N2 P2(34)	—	
2	22	BK	40''	N1A3 J13(h)	—	N1N2 P2(35)	—	
3	22	W/BK/ V/R	40''	N1A3 J13(k)	—	N1N2 P2(36)	—	
4	22	W/BR/ BL/V	40''	N1A3 J13(R)	—	N1N2 P2(37)	—	
5	22	W/BK/ G/Y	40''	N1A3 J13(2)	—	N1N2 P2(38)	—	
6	22	W/BK/ O/V	40''	N1A3 J13(A)	—	N1N2 P2(39)	—	
7	22	W/O/ BK/BL	40''	N1A3 J13(E)	—	N1N2 P2(40)	—	
8	22	O/G	38''	N1A3 J12(p)	—	N1N2 P2(41)	—	
9	22	BK	38''	N1A3 J12(q)	—	N1N2 P2(42)	—	
10	22	G	38''	N1A3 J12(P)	—	N1N2 P2(43)	—	
11	22	BK/R	38''	N1A3 J12(f)	—	N1N2 P2(44)	—	
12	22	W/O/ BR	38''	N1A3 J12(R)	—	N1N2 P2(45)	—	
13	22	W	38''	N1A3 J12(W)	—	N1N2 P2(46)	—	
14	22	W/G	38''	N1A3 J12(J)	—	N1N2 P2(47)	—	
15	22	R/Y	38''	N1A3 J12(X)	—	N1N2 P2(48)	—	
16	22	Y/G	38''	N1A3 J12(g)	—	N1N2 P2(49)	—	
17	22	BL	38''	N1A3 J12(G)	—	N1N2 P2(50)	—	
18	22	BK	40''	N1A3 J13(u)	—	N1N2 P2(19)	—	
19	22	BK	40''	N1A3 J13(L)	—	N1N2 P2(20)	—	
20	22	BK	40''	N1A3 J13(S)	—	N1N2 P2(21)	—	
21	22	BK	40''	N1A3 J13(z)	—	N1N2 P2(22)	—	

Figure 10-32. Connector Panel to Chassis Interconnecting Wiring List (Sheet 1 of 7)

WIRE NO.	WIRE AWG	COLOR	APPROX. LENGTH	FROM	TERM ITEM	TO	TERM ITEM	REMARKS
22	22	BK	40''	N1A3 J13(B)	—	N1N2 P2(23)	—	
23	22	BK	40''	N1A3 J13(F)	—	N1N2 P2(24)	—	
24	22	R/G	38''	N1A3 J12(b)	—	N1N2 P2(26)	—	
25	22	W/R	38''	N1A3 J12(Z)	—	N1N2 P2(27)	—	
26	22	V/G	38''	N1A3 J12(V)	—	N1N2 P2(28)	—	
27	22	Y/BL	38''	N1A3 J12(h)	—	N1N2 P2(29)	—	
28	22	R/O	38''	N1A3 J12(a)	—	N1N2 P2(30)	—	
29	22	W/BK	38''	N1A3 J12(U)	—	N1N2 P2(31)	—	
30	22	R/BL	38''	N1A3 J12(Y)	—	N1N2 P2(32)	—	
31	22	BK/D	38''	N1A3 J12(d)	—	N1N2 P2(33)	—	
32	22	WG/B-K/BL	40''	N1A3 J13(3)	—	N1N2 P2(1)	—	
33	22	W/BR/D/G	40''	N1A3 J13(v)	—	N1N2 P2(2)	—	
34	22	O/BL	38''	N1A3 J12(w)	—	N1N2 P2(3)	—	
35	22	D/Y	38''	N1A3 J12(u)	—	N1N2 P2(4)	—	
36	22	W/BK/G	38''	N1A3 J12(CC)	—	N1N2 P2(5)	—	
37	22	O/R/W	38''	N1A3 J12(z)	—	N1N2 P2(6)	—	
38	22	BR	38''	N1A3 J12(y)	—	N1N2 P2(7)	—	
39	22	W/O	38''	N1A3 J12(H)	—	N1N2 P2(8)	—	
40	22	W/BK/Y	38''	N1A3 J12(F)	—	N1N2 P2(9)	—	
41	22	W/GY	38''	N1A3 J12(N)	—	N1N2 P2(10)	—	
42	22	W/BR	38''	N1A3 J12(K)	—	N1N2 P2(11)	—	

Figure 10-32. Connector Panel to Chassis Interconnecting Wiring List (Sheet 2 of 7)

WIRE NO.	WIRE AWG	COLOR	APPROX. LENGTH	FROM	TERM ITEM	TO	TERM ITEM	REMARKS
43	22	W/GY/ R	38"	N1A3 J12(D)	—	N1N2 P2(12)	—	
44	22	W/R/V	38"	N1A3 J12(E)	—	N1N2 P2(13)	—	
45	22	W/V	38"	N1A3 J12(L)	—	N1N2 P2(14)	—	
46	22	W/Y	38"	N1A3 J12(M)	—	N1N2 P2(15)	—	
47	22	W/Y/R	38"	N1A3 J12(B)	—	N1N2 P2(16)	—	
48	22	V/W/R	38"	N1A3 J12(C)	—	N1N2 P2(17)	—	
49	22	BK	40"	N1A3 J13(Z)	—	N1N2 P3(34)	—	
50	22	W/G/ BL/V	40"	N1A3 J13(Y)	—	N1N2 P3(35)	—	
51	22	BK	40"	N1A3 J13(r)	—	N1N2 P3(36)	—	
52	22	W/BK/ BRJ13 (p)	40"	N1A3 P3(37	—	N1N2	—	
53	22	BK	40"	N1A3 J13(x)	—	N1N2 P3(38)	—	
54	22	W/BK/ Y/V	40"	N1A3 J13(w)	—	N1N2 P3(39)	—	
55	22	V	38"	N1A3 J12(FF)	—	N1N2 P3(40)	—	
56								
57								
58								
59								
60	22	BK	38"	N1A3 J12(T)	—	N1N2 P2(45)	—	
61	22	R/W	38"	N1A3 J12(HH)	—	N1N2 P3(46	—	
62	22	BK	38"	N1A3 J12(S)	—	N1N2 P2(47)	—	
63	22	BK	40"	N1A3 J13(5)	—	N1N2 P3(48)	—	

Figure 10-32. Connector Panel to Chassis Interconnecting Wiring List (Sheet 3 of 7)

WIRE NO.	WIRE AWG	COLOR	APPROX. LENGTH	FROM	TERM ITEM	TO	TERM ITEM	REMARKS
64	22	W/Y/V	38''	N1A3 J12(GG)	—	N1N2 P3(49)	—	
65	COAX. CABLE	BK	30''	N1A3 J7(1)(GND)	—	N1N2 P3(50)	—	
66	22	BK	38''	N1A3 J12(r)	—	N1N2 P3(18)	—	
67	22	O/W	40''	N1A3 J12(s)	—	N1N2 P3(19)	—	
68	22	BK	40''	N1A3 J13(m)	—	N1N2 P3(20)	—	
69	22	Y/O	38''	N1A3 J12(n)	—	N1N2 P3(21)	—	
70	22	BK	38''	N1A3 J12(j)	—	N1N2 P3(22)	—	
71	22	Y/W	38''	N1A3 J12(k)	—	N1N2 P3(23)	—	
72	22	BK/Y	38''	N1A3 J12(e)	—	N1N2 P3(31)	—	
73	COAX. CABLE	BK	—	N1A3 J7(2)(CTR)	—	N1N2 P3(33)	—	
74	22	Y/R/W	38''	N1A3 J12(BB)	—	N1N2 P3(1)	—	
75	22	BK	40''	N1A3 J13(4)	—	N1N2 P3(2)	—	
76	22	BK	38''	N1A3 J12(v)	—	N1N2 P3(4)	—	
77	22	BK	38''	N1A3 J12(t)	—	N1N2 P3(5)	—	
78	22	BK	38''	N1A3 J12(AA)	—	N1N2 P3(7)	—	
79	22	BK	38''	N1A3 J12(x)	—	N1N2 P3(8)	—	
80	22	BK/V	38''	N1A3 J12(c)	—	N1N2 P3(42)	—	
81								
82								
83								
84								
85	22	W/BK/ BR/Y	40''	N1A3 J13(6)	—	N1N2 P3(14)	—	

Figure 10-32. Connector Panel to Chassis Interconnecting Wiring List (Sheet 4 of 7)

WIRE NO.	WIRE AWG	COLOR	APPROX. LENGTH	FROM	TERM ITEM	TO	TERM ITEM	REMARKS
86	22	O	38''	N1A3 J12(DD)	—	N1N2 P3(15)	—	
87	22	W	38''	N1A3 J12(i)	—	N1N2 P3(16)	—	
88		47Ω 1W 5% (R2)		N1A3 J11(C)	—	N1N3 CR2(4)	—	
89	22	R/G	36''	N1A3 CR2(4)	—	N1N2 P3(13)	—	
90		47Ω 1W 5% (R3)		N1A3 J11(B)	—	N1N3 CR2(3)	—	
91	22	R/O	36''	N1A3 CR2(3)	—	N1N2 P3(44)	—	
92		47Ω 1W 5% (R2)		N1A3 J11(C)	—	N1N3 CR2(2)	—	
93	22	R/W	36''	N1A3 CR2 (2)	—	N1N2 P3(43)	—	
94		47Ω 1W 5% (R1)		N1A3 J11(D)	—	N1N3 CR2(1)	—	
95	22	R/BL	36''	N1A3 CR2(1)	—	N1N2 P3(10)	—	
96		47Ω 1W 5% (R8)		N1A3 J11(E)	—	N1N6 CR1(1)	—	
97	22	R/Y	39''	N1A3 CR(1)	—	N1N2 P3(11)	—	
98		47Ω 1W 5% (R7)		N1A3 J11(F)	—	N1N3 CR1(2)	—	
99	22	V/G	39''	N1A3 CR1(2)	—	N1N2 P3(12)	—	
100		47Ω 1W 5% (R6)		N1A3 J11(G)	—	N1N3 CR1(3)	—	
101	22	V/O	39''	N1A3 CR1(3)	—	N1N2 P3(4)	—	

Figure 10-32. Connector Panel to Chassis Interconnecting Wiring List (Sheet 5 of 7)

WIRE NO.	WIRE AWG	COLOR	APPROX. LENGTH	FROM	TERM ITEM	TO	TERM ITEM	REMARKS
102		47Ω 1W 5% (R5)		N1A3 J11(H)	— —	N1N3 CR1(4)	— —	
103	22	V/Y	39''	N1A3 CR1(4)	—	N1N3 P3(42)	—	
104	22	V/W	18''	N1A3 J11(1)	—	N1N3 J7(2)(CTR)	—	TWISTED PAIR 18 TURNS / FT.
105	22	BK	18''	N1A3 J11(J)	—	N1N3 J7(1)(GND)	—	
106	16	GY	55''	N1A3 J1(1)	—	N1N1 S1(2)	—	
107	16	W/GY	55''	N1A3 J1(3)	—	N1N1 S1(5)	—	
108	COAX. CABLE	BK	42''	N1A3 J2(2)(2)(CTR)	—	N1N2 E5	—	
109	COAX. CABLE	BK		N1A3 J2(1)(GND)	—	N1N2 E6	—	
110	COAX. CABLE	BK	42''	N1A3 J3(2)(CTR)	—	N1N2 E3	—	
111	COAX. CABLE	BK		N1A3 J3(1)(GND)	—	N1N2 E4	—	
112	COAX. CABLE	BK	42''	N1A3 J4(2)(CTR)	—	N1N2 E1	—	
113	COAX. CABLE	BK		N1A3 J4(1)(GND)	—	N1N2 E2	—	
114	COAX. CABLE	BK	42''	N1A3 J5(2)(CTR)	—	N1N2 E9	—	
115	COAX. CABLE	BK		N1A3 J5(1)(GND)	—	N1N2 E10	—	
116	COAX. CABLE	BK	42''	N1A3 J6(2)(CTR)	—	N1N2 E7	—	
117	COAX. CABLE	BK		N1A3 J6(1)(GND)	—	N1N2 E8	—	
118	COAX. CABLE	BK	42''	N1A3 J7(2)(GND)	—	N1N2 P3(33)	—	
119	COAX. CABLE	BK		N1A3 J7(1)(GND)	—	N1N2 P3(17)	—	
120	COAX. CABLE	BK	42''	N1A3 J8(2)(CTR)	—	N1N2 E15	—	
121	COAX. CABLE	BK		N1A3 J8(1)(GND)	—	N1N2 E16	—	

Figure 10-32. Connector Panel to Chassis Interconnecting Wiring List (Sheet 6 of 7)

WIRE NO.	WIRE AWG	COLOR	APPROX. LENGTH	FROM	TERM ITEM	TO	TERM ITEM	REMARKS
122	COAX. CABLE	BK	42''	N1A3 J9(2)(CTR)	— —	N1N2 E13	— —	
123	COAX. CABLE	BK		N1A3 J9(1)(GND)	— —	N1N2 E14	— —	
124	COAX. CABLE		42''	N1A3 J10(2)(CTR)	—	N1N2 E11	—	
125	COAX. CABLE	BK		N1A3 J10(1)(GND)	—	N1N2 E12	—	
126	16	G	2-1/2''	N1A3 J1(2)	—	N1N3 GND.LUG	—	

Figure 10-32. Connector Panel to Chassis Interconnecting Wiring List (Sheet 7 of 7)

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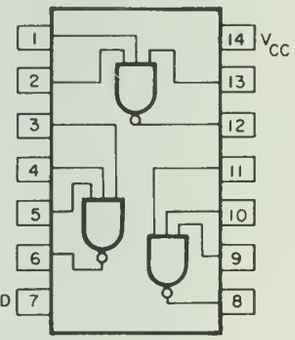
100139 — S54LS10F (883B) SCHOTTKY TRIPLE 3-INPUT POSITIVE NAND GATE

LOGIC DIAGRAM

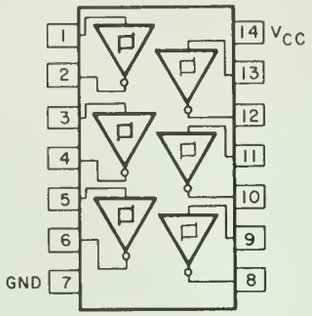


TRUTH TABLE

INPUT			OUTPUT
1	2	3	4
1	1	1	0
1	0	0	1
0	1	0	1
0	0	1	1
1	1	0	1
0	1	1	1
1	0	1	1

7100140 — S54LS14F (883B) SCHOTTKY HEX SCHMITT TRIGGER INVERTER

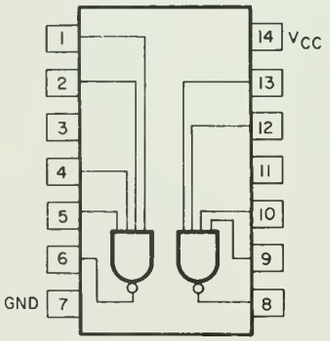
LOGIC DIAGRAM



This element is a Schottky hex Schmitt-trigger positive-NAND gate and inverter with totem-pole outputs.

7100141 — S54LS20F (883B) SCHOTTKY DUAL 4-INPUT POSITIVE NAND GATE

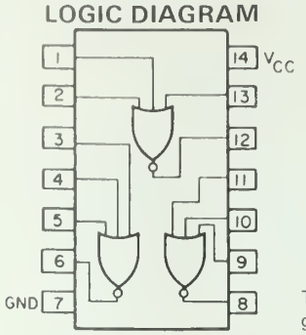
LOGIC DIAGRAM



This element is a Schottky dual 4-input positive-NAND gate with totem-pole outputs. Each gate produces a logical "0" output when both inputs are "1" and a "1" output if any of the inputs are "0".

7100142 — S54LS27F (883B) SCHOTTKY TRIPLE 3-INPUT NOR GATE

LOGIC DIAGRAM



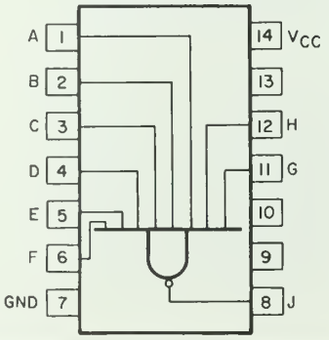
TRUTH TABLE

INPUT			OUTPUT
1	2	3	4
0	0	0	0
1	0	0	1
0	1	0	1
0	0	1	1
1	1	0	1
1	0	1	1
0	1	1	1
1	1	1	1

This element is a Schottky triple 3-input NAND gate with totem-pole outputs. Each gate produces a logic "0" output when all inputs are "1" and a "1" output if any of the inputs are "0".

7100143 — S54LS30F (883B) SCHOTTKY 8-INPUT POSITIVE NAND GATE

LOGIC DIAGRAM

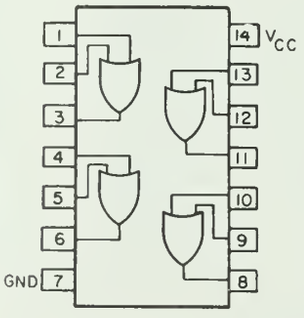


This element is a Schottky 8-input NAND gate. It produces a logical "0" output when all inputs are "1" and a "1" output if any of the inputs are "0".

$J = \overline{A \cdot B \cdot C \cdot D \cdot E \cdot F \cdot G \cdot H}$

7100144 — S54LS32F (883B) SCHOTTKY QUAD 2-INPUT POSITIVE OR GATE

LOGIC DIAGRAM



TRUTH TABLE

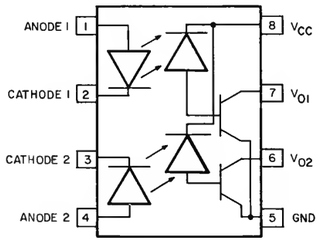
INPUT		OUTPUT
1	2	3
0	0	0
0	1	1
1	0	1
1	1	1

This element is a Schottky quad 2-input positive OR gate with totem-pole outputs. It produces a logical "1" output when one of its inputs is logical "1" and a logical "0" output when both of its inputs are "0".

Figure 10-33. Integrated Circuit Data (Sheet 1 of 9)

7040045 – HCPL-2531 DUAL OPTOCOUPLER

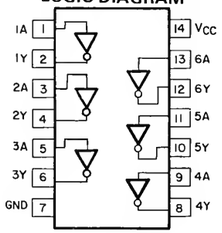
LOGIC DIAGRAM



This element is a dual, high-speed optocoupler in an 8-pin dual in-line package.

7100120 – S54S04F (833B) SCHOTTKY HEX INVERTER

LOGIC DIAGRAM

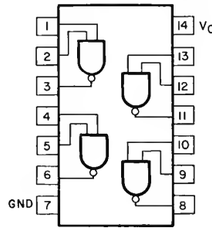


POSITIVE LOGIC $Y = \overline{A}$

This element is a Schottky inverter with totem-pole outputs.

7100135 – S54LS00F (883B) SCHOTTKY QUAD 2-INPUT POSITIVE NAND GATE

LOGIC DIAGRAM



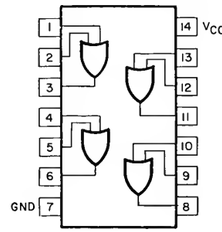
This element is a Schottky quad 2-input NAND gate. Each gate produces a logical "0" output when both inputs are "1" and a "1" output if any of the inputs are "0".

TRUTH TABLE

INPUT		OUTPUT
1	2	3
1	1	0
1	0	1
0	1	1
0	0	1

7100136 – S54LS02F (883B) SCHOTTKY QUAD 2-INPUT POSITIVE NOR GATE

LOGIC DIAGRAM



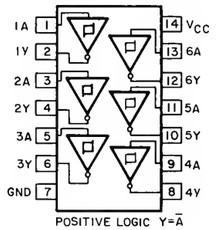
This element is a quad 2-input NOR gate with totem-pole outputs. Each gate produces a logical "0" output when one or more of its inputs are "1" and a "1" output when both inputs are "0".

TRUTH TABLE

INPUT		OUTPUT
1	2	3
0	0	1
1	0	0
0	1	0
1	1	0

7100137 – S54LS04F (883B) SCHOTTKY HEX INVERTER

LOGIC DIAGRAM

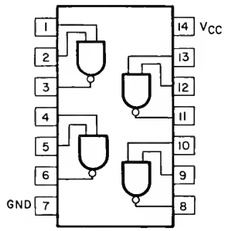


POSITIVE LOGIC $Y = \overline{A}$

This element is a Schottky inverter with totem-pole outputs.

7100138 – S54LS08F (883B) SCHOTTKY QUAD 2-INPUT POSITIVE AND GATE

LOGIC DIAGRAM



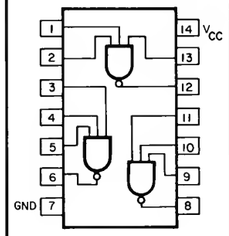
This element is a Schottky quad 2-input AND gate with totem-pole outputs. On any one gate, when either input is "0", the output is "0". When both inputs are "1", the output is "1".

TRUTH TABLE

INPUT		OUTPUT
1	2	3
0	0	0
0	1	0
1	0	0
1	1	1

7100139 – S54LS10F (883B) SCHOTTKY TRIPLE 3-INPUT POSITIVE NAND GATE

LOGIC DIAGRAM

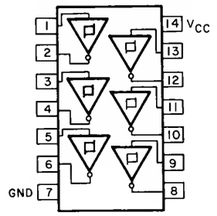


TRUTH TABLE

INPUT			OUTPUT
1	2	3	4
1	1	1	0
1	0	0	1
0	1	0	1
0	0	1	1
1	0	1	1
0	1	1	1
1	1	1	1

7100140 – S54LS14F (883B) SCHOTTKY HEX SCHMITT TRIGGER INVERTER

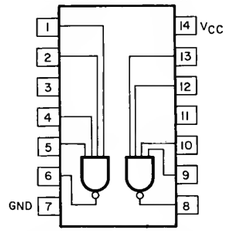
LOGIC DIAGRAM



This element is a Schottky hex Schmitt-trigger positive-NAND gate and inverter with totem-pole outputs.

7100141 – S54LS20F (883B) SCHOTTKY DUAL 4-INPUT POSITIVE NAND GATE

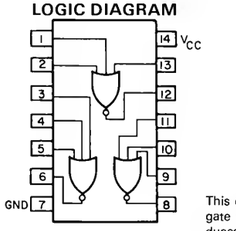
LOGIC DIAGRAM



This element is a Schottky dual 4-input positive-NAND gate with totem-pole outputs. Each gate produces a logical "0" output when both inputs are "1" and a "1" output if any of the inputs are "0".

7100142 – S54LS27F (883B) SCHOTTKY TRIPLE 3-INPUT NOR GATE

LOGIC DIAGRAM



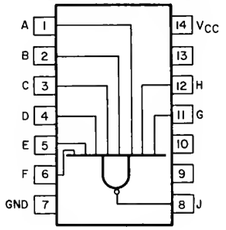
TRUTH TABLE

INPUT			OUTPUT
1	2	3	4
0	0	0	0
1	0	0	1
0	1	0	1
0	0	1	1
1	1	0	1
0	1	1	1
1	1	1	1

This element is a Schottky triple 3-input NAND gate with totem-pole outputs. Each gate produces a logic "0" output when all inputs are "1" and a "1" output if any of the inputs are "0".

7100143 – S54LS30F (883B) SCHOTTKY 8-INPUT POSITIVE NAND GATE

LOGIC DIAGRAM

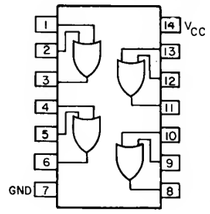


This element is a Schottky 8-input NAND gate. It produces a logical "0" output when all inputs are "1" and a "1" output if any of the inputs are "0".

$J = \overline{A \cdot B \cdot C \cdot D \cdot E \cdot F \cdot G \cdot H}$

7100144 – S54LS32F (883B) SCHOTTKY QUAD 2-INPUT POSITIVE OR GATE

LOGIC DIAGRAM



TRUTH TABLE

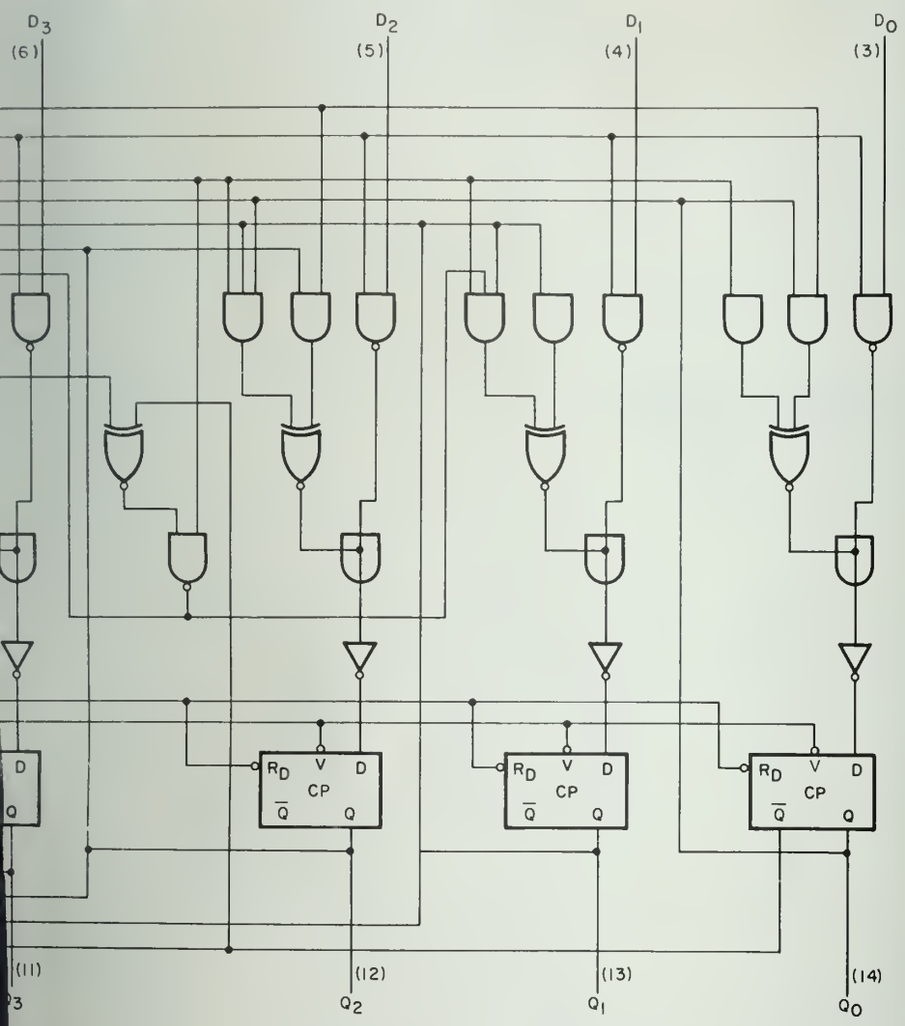
INPUT		OUTPUT
1	2	3
0	0	0
0	1	1
1	0	1
1	1	1

This element is a Schottky quad 2-input positive OR gate with totem-pole outputs. It produces a logical "1" output when one of its inputs is logical "1" and a logical "0" output when both of its inputs are "0".

Figure 10-33. Integrated Circuit Data (Sheet 1 of 9)

7100155 — S54LS161F (883B)
OTTKY 4-BIT BINARY COUNTER

LOGIC DIAGRAM



a Schottky high speed 4-bit binary counter. The counters are positive synchronously presettable and are easily cascaded to n-bit synchronous erminal count output is provided which detects a count of HHHH. The nchronously clears all flip-flops.

MODE SELECT — FUNCTION TABLE

OPERATING MODE	INPUTS						OUTPUTS	
	MR	CP	CEP	CET	PE	D_N	Q_N	TC
RESET (CLEAR)	L	X	X	X	X	X	L	L
PARALLEL LOAD	H		X	X	l	l	L	L
	H		X	X	l	h	H	(B)
COUNT	H		h	h	h(D)	X	COUNT	(B)
HOLD (DO NOTHING)	H	X	l(C)	X	h(D)	X	Q_N	(B)
	H	X	X	l(C)	h(D)	X	Q_N	L

H = HIGH VOLTAGE LEVEL STEADY STATE
L = LOW VOLTAGE LEVEL STEADY STATE
h = HIGH VOLTAGE LEVEL ONE SETUP TIME PRIOR TO THE LOW-TO-HIGH CLOCK TRANSITION
l = LOW VOLTAGE LEVEL ONE SETUP TIME PRIOR TO THE LOW-TO-HIGH CLOCK TRANSITION
X = DON'T CARE
q = LOWER CASE LETTERS INDICATE THE STATE OF THE REFERENCED OUTPUT PRIOR TO THE LOW-TO-HIGH CLOCK TRANSITION
= LOW-TO-HIGH CLOCK TRANSITION

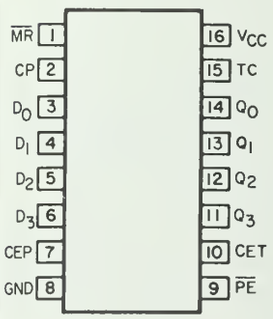
NOTES

(B) THE TC OUTPUT IS HIGH WHEN CET IS HIGH AND THE COUNTER IS AT TERMINAL COUNT (HHHH FOR "161")

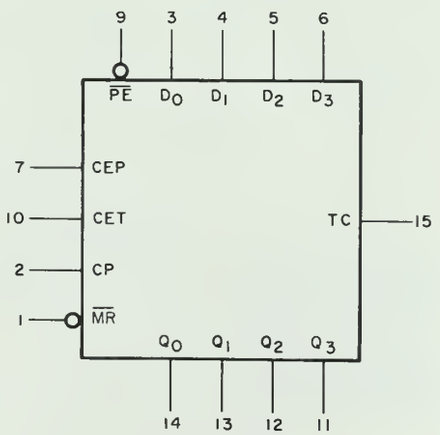
(C) THE HIGH-TO-LOW TRANSITION OF CEP OR CET ON THE 54/74161 SHOULD ONLY OCCUR WHILE CP IS HIGH FOR CONVENTIONAL OPERATION

(D) THE LOW-TO-HIGH TRANSITION OF PE ON THE 54/74161 SHOULD ONLY OCCUR WHILE CP IS HIGH FOR CONVENTIONAL OPERATION

PIN CONFIGURATION



LOGIC SYMBOL

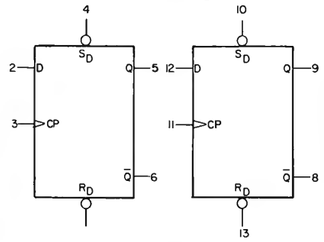


V_{CC} = Pin 16
GND = Pin 8

Figure 10-33. Integrated Circuit Data (Sheet 2 of 9)

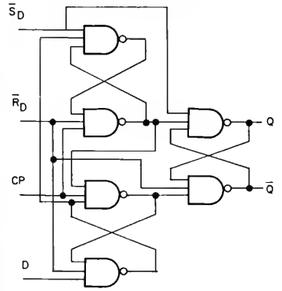
7100145 — S54LS74F (883B)
SCHOTTKY DUAL D-TYPE EDGE TRIGGERED FLIP-FLOP

LOGIC SYMBOL

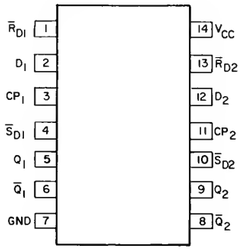


This element is a Schottky dual positive edge-triggered D-type flip-flop featuring individual data, clock, set and reset inputs, also complementary Q and $\overline{Q}$ outputs. Information on the data (D) input is transferred to the Q output on the low-to-high transition of the clock pulse.

LOGIC DIAGRAM



PIN CONFIGURATION



MODE SELECT—TRUTH TABLE

OPERATING MODE	INPUTS				OUTPUTS	
	$\overline{S}_D$	$\overline{R}_D$	CP	D	Q	$\overline{Q}$
ASYNCHRONOUS SET	L	H	X	X	H	L
ASYNCHRONOUS RESET (CLEAR)	H	L	X	X	L	H
UNDETERMINED (c)	L	L	X	X	H	H
LOAD "I" (SET)	H	H		h	H	L
LOAD "0" (RESET)	H	H		I	L	H

H = HIGH VOLTAGE LEVEL STEADY STATE.
h = HIGH VOLTAGE LEVEL ONE SETUP TIME PRIOR TO THE LOW TO HIGH CLOCK TRANSITION.
L = LOW VOLTAGE LEVEL STEADY STATE.
I = LOW VOLTAGE LEVEL ONE SETUP TIME PRIOR TO THE LOW TO HIGH CLOCK TRANSITION.
X = DON'T CARE

7100147 — DM54LS86J (883B) SCHOTTKY QUAD 2-INPUT EXCLUSIVE OR GATE

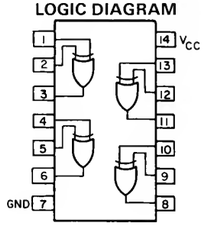
TRUTH TABLE

INPUTS		OUTPUT
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

L = LOW VOLTAGE LEVEL
H = HIGH VOLTAGE LEVEL

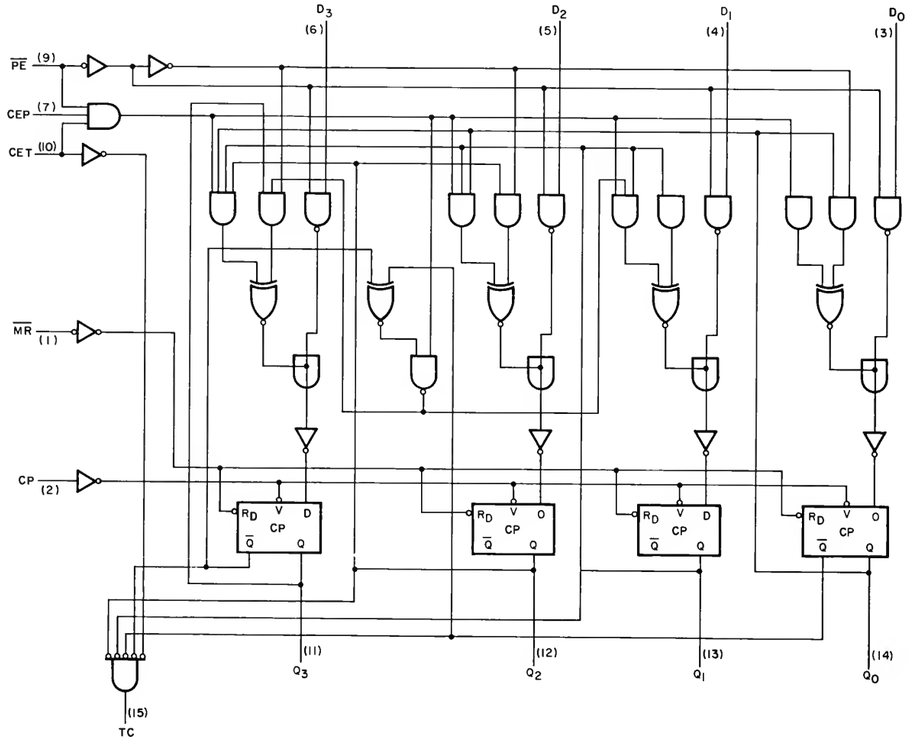
This element is a Schottky quad 2-input exclusive OR gate. On any one gate, when one, but not both, inputs are high, the output is high. When both inputs are high or both inputs are low, the output is low.

LOGIC DIAGRAM



7100155 — S54LS161F (883B) SCHOTTKY 4-BIT BINARY COUNTER

LOGIC DIAGRAM



V_{CC} = PIN 16
GND = PIN 8
( ) = PIN NUMBER

This element is a Schottky high speed 4-bit binary counter. The counters are positive edge-triggered, synchronously presettable and are easily cascaded to n-bit synchronous applications. A terminal count output is provided which detects a count of HHHH. The master reset asynchronously clears all flip-flops.

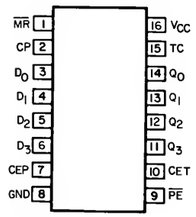
MODE SELECT — FUNCTION TABLE

OPERATING MODE	INPUTS						OUTPUTS	
	MR	CP	CEP	CET	PE	D_N	Q_N	TC
RESET (CLEAR)	L	X	X	X	X	X	L	L
PARALLEL LOAD	H		X	X	I	I	L	L
	H		X	X	I	h	H	(B)
COUNT	H		h	h	h(D)	X	COUNT	(B)
HOLD (DO NOTHING)	H	X	I(C)	X	h(D)	X	q_N	(B)
	H	X	X	I(C)	h(D)	X	q_N	L

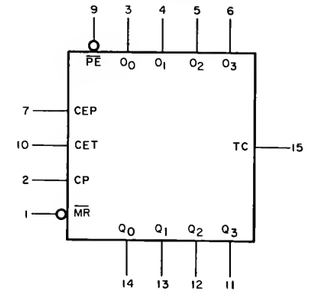
H = HIGH VOLTAGE LEVEL STEADY STATE
L = LOW VOLTAGE LEVEL STEADY STATE
h = HIGH VOLTAGE LEVEL ONE SETUP TIME PRIOR TO THE LOW-TO-HIGH CLOCK TRANSITION
I = LOW VOLTAGE LEVEL ONE SETUP TIME PRIOR TO THE LOW-TO-HIGH CLOCK TRANSITION
X = DON'T CARE
q = LOWER CASE LETTERS INDICATE THE STATE OF THE REFERENCED OUTPUT PRIOR TO THE LOW-TO-HIGH CLOCK TRANSITION
= LOW-TO-HIGH CLOCK TRANSITION

NOTES
(B) THE TC OUTPUT IS HIGH WHEN CET IS HIGH AND THE COUNTER IS AT TERMINAL COUNT (HHHH FOR "161")
(C) THE HIGH-TO-LOW TRANSITION OF CEP OR CET ON THE 54/74161 SHOULD ONLY OCCUR WHILE CP IS HIGH FOR CONVENTIONAL OPERATION
(D) THE LOW-TO-HIGH TRANSITION OF PE ON THE 54/74161 SHOULD ONLY OCCUR WHILE CP IS HIGH FOR CONVENTIONAL OPERATION

PIN CONFIGURATION



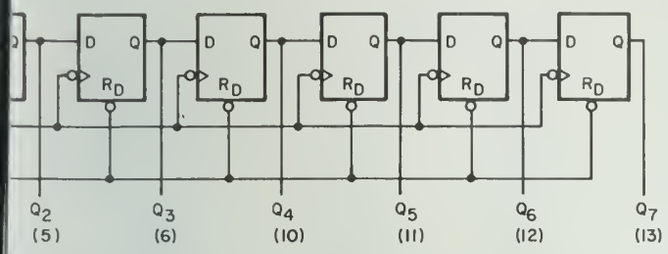
LOGIC SYMBOL



V_{CC} = Pin 16
GND = Pin 8

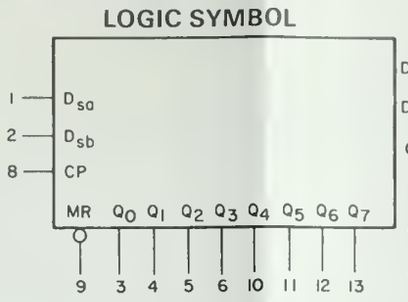
Figure 10-33. Integrated Circuit Data (Sheet 2 of 9)

7100218 – S54LS164F (883B)
SCHOTTKY 8-BIT SERIAL-IN PARALLEL-OUT SHIFT REGISTER



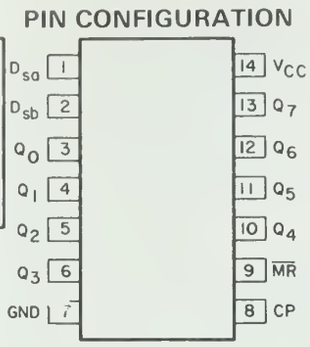
y high speed 8-bit serial-in, parallel-out shift register featur-
l an asynchronous master reset. Serial data is entered through
hronously with the low to high clock transition. An asyn-
hich clears the register, setting all outputs low independent

LOGIC SYMBOL



V_{CC} = PIN 14
GND = PIN 7

PIN CONFIGURATION

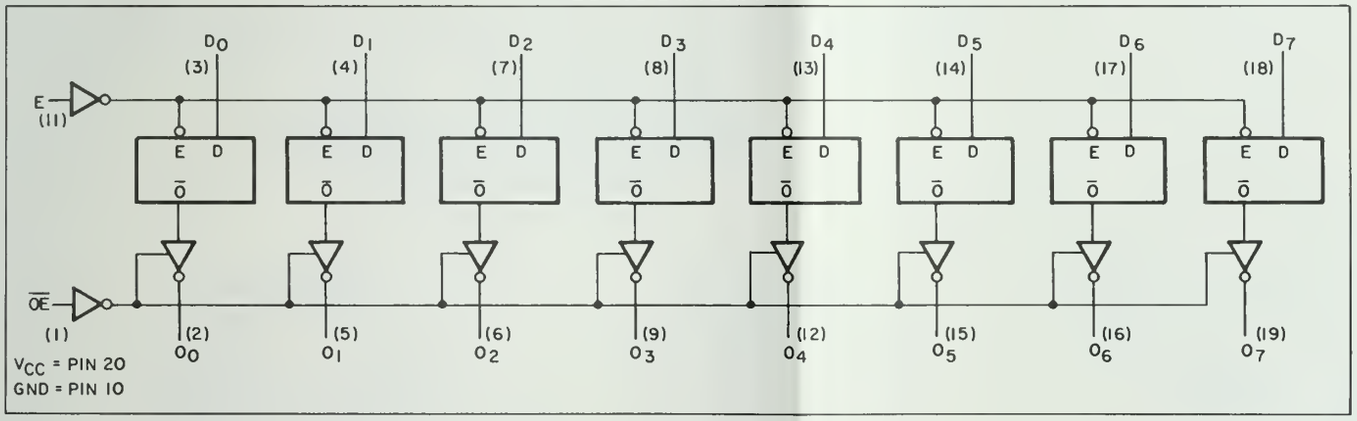


MODE SELECT – TRUTH TABLE

OPERATING MODE	INPUTS				OUTPUTS	
	MR	CP	D_{SA}	D_{SB}	Q_0	Q_1–Q_7
RESET (CLEAR)	L	X	X	X	L	L – L
SHIFT	H	↑	l	l	L	q_0–q_6
	H	↑	l	h	L	q_0–q_6
	H	↑	h	l	L	q_0–q_6
	H	↑	h	h	H	q_0–q_6

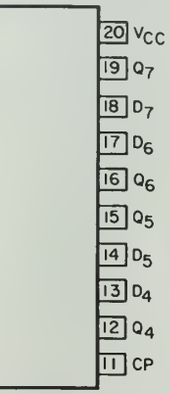
7100223 – DM54S373J (883B)
OCTAL D TYPE LATCH

LOGIC DIAGRAM

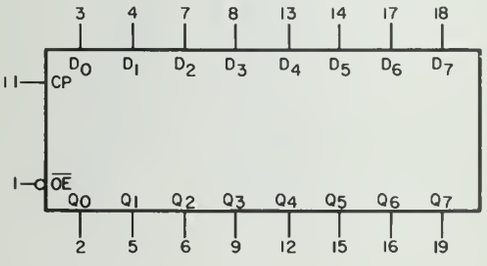


V_{CC} = PIN 20
GND = PIN 10

IFIGURATION



LOGIC SYMBOL



V_{CC} = PIN 20
GND = PIN 10

MODE SELECT-FUNCTION TABLE

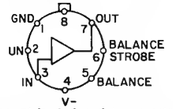
OPERATING MODES	INPUTS			OUTPUTS
	OE	E	D	INTERNAL REGISTER	Q_0–Q_7
ENABLE & READ REGISTER	L	H	L	L	L
	L	H	H	H	H
LATCH & READ REGISTER	L	L	l	L	L
	L	L	h	H	H
LATCH REGISTER & DISABLE OUTPUTS	H	L	l	L	(Z)
	H	L	h	H	(Z)

This element is an octal transparent latch coupled to eight 3-state output buffers. The two sections of the device are controlled independently by latch enable G and output control gates.

H = HIGH VOLTAGE LEVEL
h = HIGH VOLTAGE ONE SETUP TIME PRIOR TO THE HIGH TO LOW ENABLE TRANSITION
L = LOW VOLTAGE LEVEL
l = LOW VOLTAGE LEVEL ONE SETUP TIME PRIOR TO THE HIGH TO LOW ENABLE TRANSITION
(Z) = HIGH IMPEDANCE "OFF" STATE

Figure 10-33. Integrated Circuit Data (Sheet 3 of 9)

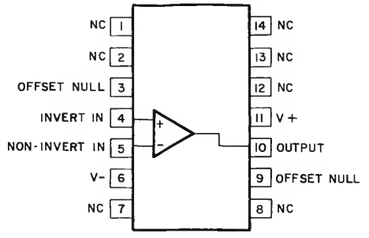
7100159 — μAF111HMQB VOLTAGE COMPARATOR



This element is designed to operate over a wide range of supply voltages, ranging from standard ±15V op-amp supplies down to a single 5V supply used for I.C. logic. The output is compatible with TTL as well as MOS circuits. The 111 can drive lamps, relays or switching voltages up to 50 volts at currents as high as 50mA.

7100169 — μA741DMQB OPERATIONAL AMPLIFIER

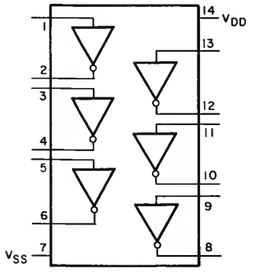
LOGIC DIAGRAM



This element is a general purpose operational amplifier which features improved performance over many industry standards. These features include overload protection on the input and output, no latch-up when the common mode range is exceeded, and freedom from oscillations.

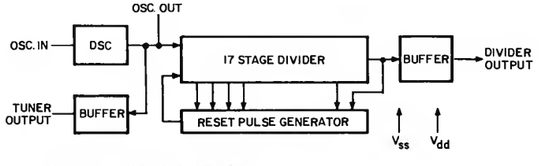
7100202 - CD4069UBMJ (883B) HEX INVERTER

LOGIC DIAGRAM



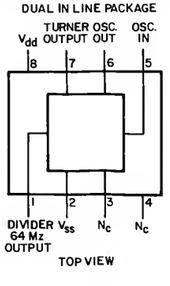
This element consists of six inverter circuits and is manufactured using complementary CMOS to achieve wide power supply operating range, low power consumption, high noise immunity and symmetric controlled rise and fall times.

7100215 — MM5369AA/N OSCILLATOR PRESCALER, 3.58 MHz TO 60 Hz



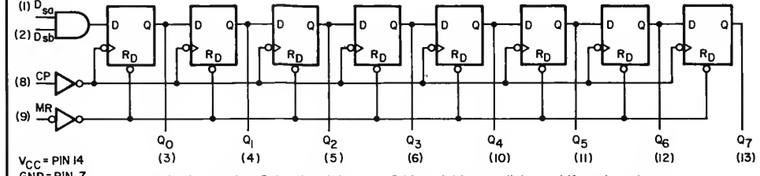
CONNECTION DIAGRAM

DUAL IN LINE PACKAGE



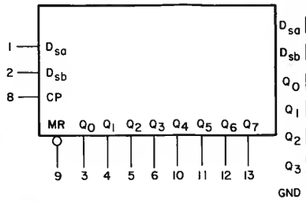
This element is a CMOS integrated circuit with 17 binary divider stages that can be used to generate a precise 60 Hz reference from commonly available high frequency quartz crystals. An internal pulse is generated by mask programming the combinations of stages 1 through 4, 16 and 17 to set or reset the individual stages.

7100218 — S54LS164F (883B) SCHOTTKY 8-BIT SERIAL-IN PARALLEL-OUT SHIFT REGISTER

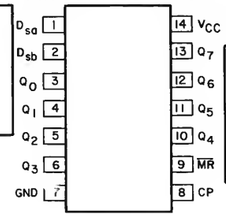


This element is a Schottky high speed 8-bit serial-in, parallel-out shift register featuring grated serial inputs and an asynchronous master reset. Serial data is entered through a 2-input AND gate synchronously with the low to high clock transition. An asynchronous master reset which clears the register, setting all outputs low independent of the clock, is featured.

LOGIC SYMBOL



PIN CONFIGURATION

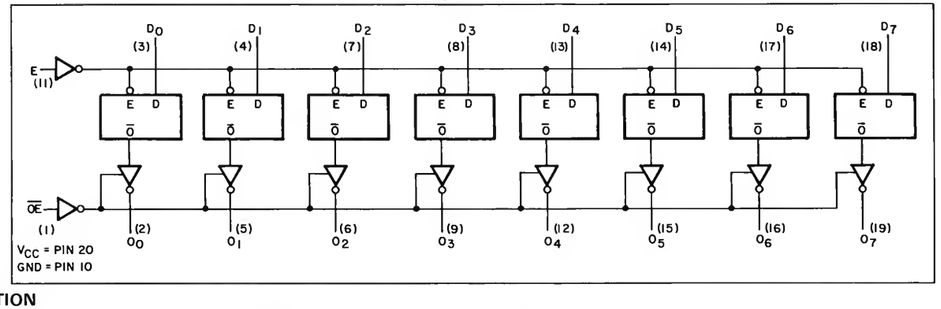


MODE SELECT — TRUTH TABLE

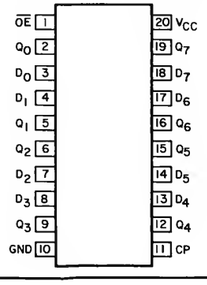
OPERATING MODE	INPUTS				OUTPUTS	
	MR	CP	DSA	DSB	Q0	Q1-Q7
RESET (CLEAR)	L	X	X	X	L	L - L
SHIFT	H	↑	l	l	L	Q0-Q6
	H	↑	h	l	L	Q0-Q6
	H	↑	l	h	L	Q0-Q6
	H	↑	h	h	H	Q0-Q6

7100223 — DM54S373J (883B) OCTAL D TYPE LATCH

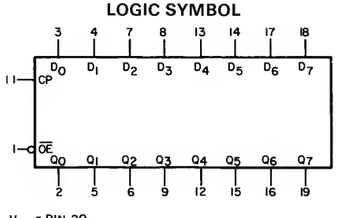
LOGIC DIAGRAM



PIN CONFIGURATION



LOGIC SYMBOL



MODE SELECT-FUNCTION TABLE

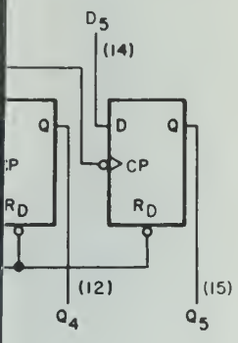
OPERATING MODES	INPUTS		OUTPUTS
	OE E D	INTERNAL REGISTER	Q0-Q7
ENABLE & READ REGISTER	L H L L H H	L H	L H
LATCH & READ REGISTER	L L l L L h	L H	L H
LATCH REGISTER & DISABLE OUTPUTS	H L l H L h	L H	(Z) (Z)

H = HIGH VOLTAGE LEVEL
h = HIGH VOLTAGE ONE SETUP TIME PRIOR TO THE HIGH TO LOW ENABLE TRANSITION
L = LOW VOLTAGE LEVEL
l = LOW VOLTAGE LEVEL ONE SETUP TIME PRIOR TO THE HIGH TO LOW ENABLE TRANSITION
(Z) = HIGH IMPEDANCE "OFF" STATE

This element is an octal transparent latch coupled to eight 3-state output buffers. The two sections of the device are controlled independently by latch enable G and output control gates.

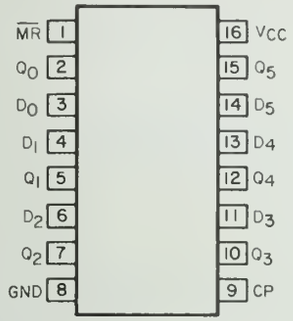
Figure 10-33. Integrated Circuit Data (Sheet 3 of 9)

00231 — S54LS174F (883B)
HOTTKY HEX D FLIP-FLOP

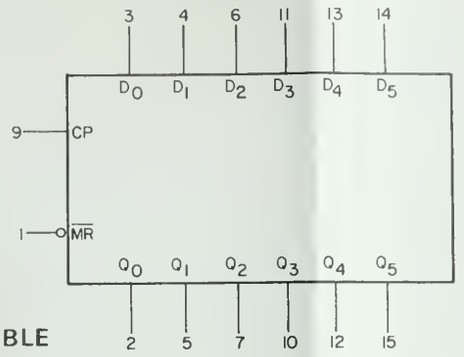


D flip-flop used
storage register.
the register during
clock pulse. The
clears all flip-flops.

PIN CONFIGURATION



LOGIC SYMBOL

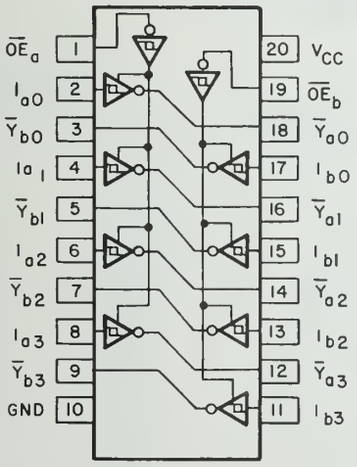


MODE SELECT—FUNCTION TABLE

OPERATING MODE	INPUTS			OUTPUTS	
	MR	CP	D_N	Q_N	$\overline{Q}_N$
RESET (CLEAR)	L	X	X	L	H
LOAD "1"	H	↑	h	H	L
LOAD "0"	H	↑	l	L	H

7100273 — S54LS240F (883B)
SCHOTTKY OCTAL INVERTER BUFFER (3-STATE)

LOGIC DIAGRAM



TRUTH TABLE

INPUTS				OUTPUTS	
$\overline{OE}_a$	I_a	$\overline{OE}_b$	I_b	Y_a	Y_b
L	L	L	L	L	L
L	H	L	H	H	H
H	X	H	X	(Z)	(Z)

H = HIGH VOLTAGE LEVEL
L = LOW VOLTAGE LEVEL
X = DON'T CARE
(Z) = HIGH IMPEDANCE (OFF) STATE

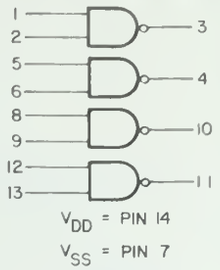
This element is a Schottky octal inverter buffer packaged in a 20 pin dual in-line package.

7100250 — MC14011BBCBS
CMOS QUAD 2-INPUT NAND GATE

TRUTH TABLE

INPUT		OUTPUT
1	2	3
1	1	0
1	0	1
0	1	1
0	0	1

LOGIC DIAGRAM

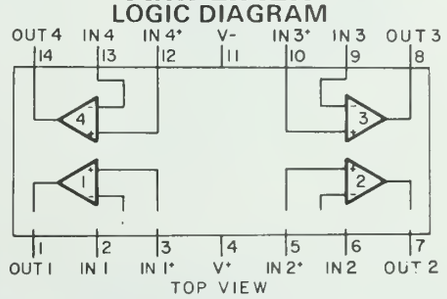


V_{DD} = PIN 14
V_{SS} = PIN 7

This element is a CMOS quad 2-input NAND gate having buffered inputs and outputs. Each gate produces a logical "0" output when both inputs are "1" and a "1" output if any of the inputs are "0".

7100291 — F μA148DMQB
QUAD 741 OPERATIONAL AMPLIFIER

LOGIC DIAGRAM

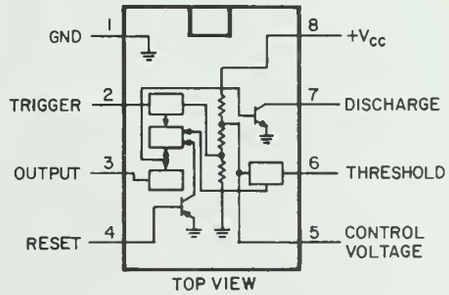


TOP VIEW

This element is a quad operational amplifier consisting of four independent, high gain, internally compensated, low power operational amplifiers which has been designed to provide functional characteristics identical to the 741 operational amplifier.

7100292 — ZM555DE (883B)
TIMER

LOGIC SYMBOL



TOP VIEW

This element is a highly stable device for generating accurate time delays or oscillation. Additional terminals are provided for triggering or resetting.

Figure 10-33. Integrated Circuit Data (Sheet 4 of 9)

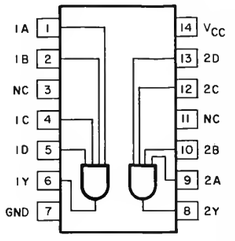
7100225 — S54LS21F (883B)
DUAL 4-INPUT POSITIVE AND GATE

TRUTH TABLE

INPUT			OUTPUT
B	C	D	Y
1	1	1	1
1	0	0	0
1	1	0	0
0	0	1	0
1	1	0	0
0	1	1	0
0	0	1	0

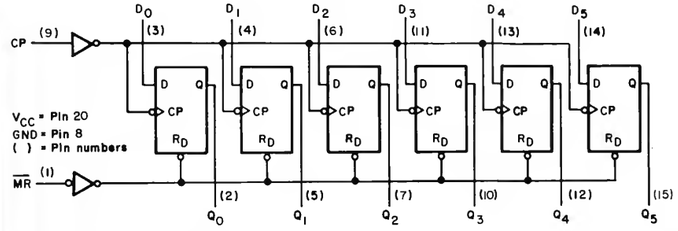
This element is a dual positive AND gate with totem-pole output. Each gate produces a logic "1" output when all inputs are "1" and a "0" output if any of the inputs are "0".

LOGIC DIAGRAM



7100231 — S54LS174F (883B)
SCHOTTKY HEX D FLIP-FLOP

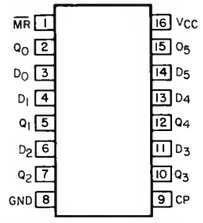
LOGIC DIAGRAM



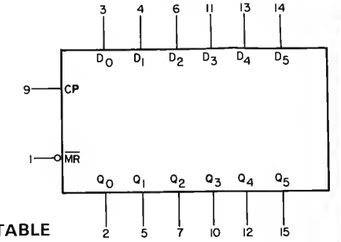
H=HIGH VOLTAGE LEVEL STEADY STATE
h=HIGH VOLTAGE LEVEL ONE SETUP TIME PRIOR TO THE LOW-TO-HIGH CLOCK TRANSITION
L=LOW VOLTAGE LEVEL STEADY STATE
l=LOW VOLTAGE LEVEL ONE SETUP TIME PRIOR TO THE LOW-TO-HIGH CLOCK TRANSITION
X=DON'T CARE
↑=LOW-TO-HIGH CLOCK TRANSITION

This element is a Schottky hex D flip-flop used primarily as a 6-bit edge-triggered storage register. Data on the D inputs is loaded into the register during the low-to-high transition of the clock pulse. The master reset input asynchronously clears all flip-flops.

PIN CONFIGURATION



LOGIC SYMBOL



MODE SELECT—FUNCTION TABLE

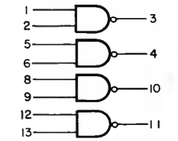
OPERATING MODE	INPUTS			OUTPUTS	
	MR	CP	D_N	Q_N	$\overline{Q}_N$
RESET (CLEAR)	L	X	X	L	H
LOAD "1"	H	↑	h	H	L
LOAD "0"	H	↑	l	L	H

7100250 — MC14011BBCBS
CMOS QUAD 2-INPUT NAND GATE

TRUTH TABLE

INPUT		OUTPUT
1	2	3
1	1	0
1	0	1
0	1	1
0	0	1

LOGIC DIAGRAM

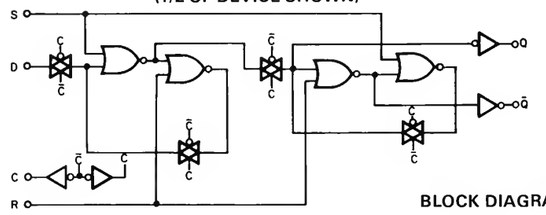


V_{DD} = PIN 14
V_{SS} = PIN 7

This element is a CMOS quad 2-input NAND gate having buffered inputs and outputs. Each gate produces a logical "0" output when both inputs are "1" and a "1" output if any of the inputs are "0".

7100251 — MC14013BBCBS
CMOS DUAL D-TYPE FLIP-FLOP

LOGIC DIAGRAM
(1/2 OF DEVICE SHOWN)



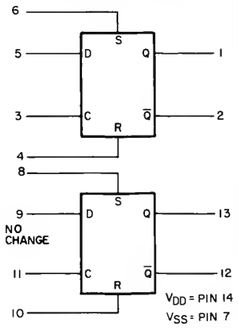
TRUTH TABLE

INPUTS				OUTPUTS	
CLOCK↑	DATA	RESET	SET	Q	$\overline{Q}$
⌐	0	0	0	0	1
⌐	1	0	0	1	0
⌐	X	0	0	Q	Q
X	X	1	0	0	1
X	X	0	1	1	0
X	X	1	1	1	1

X = DON'T CARE
Q = LEVEL CHANGE

This element consists of two identical, independent data type flip-flops. Each flip-flop has independent data, set, reset, clock inputs and Q, $\overline{Q}$ outputs.

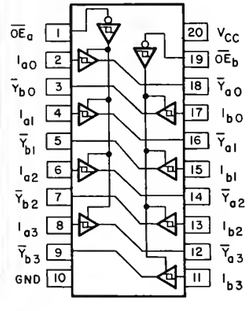
BLOCK DIAGRAM



V_{DD} = PIN 14
V_{SS} = PIN 7

7100268 — DM54LS244J (883B)
SCHOTTKY OCTAL BUFFER (3-STATE)

PIN CONFIGURATION



TRUTH TABLE

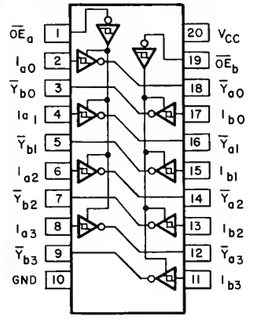
INPUTS				OUTPUTS	
$\overline{OE}_a$	I_a	$\overline{OE}_b$	I_b	Y_a	Y_b
L	L	L	L	L	L
L	H	L	H	H	H
H	X	H	X	(Z)	(Z)

H=HIGH VOLTAGE LEVEL
L=LOW VOLTAGE LEVEL
X=DON'T CARE
(Z)=HIGH IMPEDANCE (OFF) STATE

This element is a Schottky ocal buffer with tri-state outputs.

7100273 — S54LS240F (883B)
SCHOTTKY OCTAL INVERTER BUFFER (3-STATE)

LOGIC DIAGRAM



TRUTH TABLE

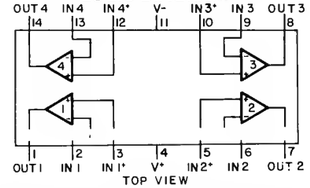
INPUTS				OUTPUTS	
$\overline{OE}_a$	I_a	$\overline{OE}_b$	I_b	Y_a	Y_b
L	L	L	L	L	L
L	H	L	H	H	H
H	X	H	X	(Z)	(Z)

H=HIGH VOLTAGE LEVEL
L=LOW VOLTAGE LEVEL
X=DON'T CARE
(Z)=HIGH IMPEDANCE (OFF) STATE

This element is a Schottky octal inverter buffer packaged in a 20 pin dual in-line package.

7100291 — F μ A148DMQB
QUAD 741 OPERATIONAL AMPLIFIER

LOGIC DIAGRAM

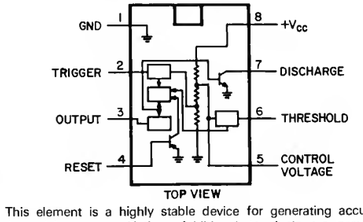


TOP VIEW

This element is a quad operational amplifier consisting of four independent, high gain, internally compensated, low power operational amplifiers which has been designed to provide functional characteristics identical to the 741 operational amplifier.

7100292 — ZM555DE (883B)
TIMER

LOGIC SYMBOL



TOP VIEW

This element is a highly stable device for generating accurate time delays or oscillation. Additional terminals are provided for triggering or resetting.

Figure 10-33. Integrated Circuit Data (Sheet 4 of 9)

GATE

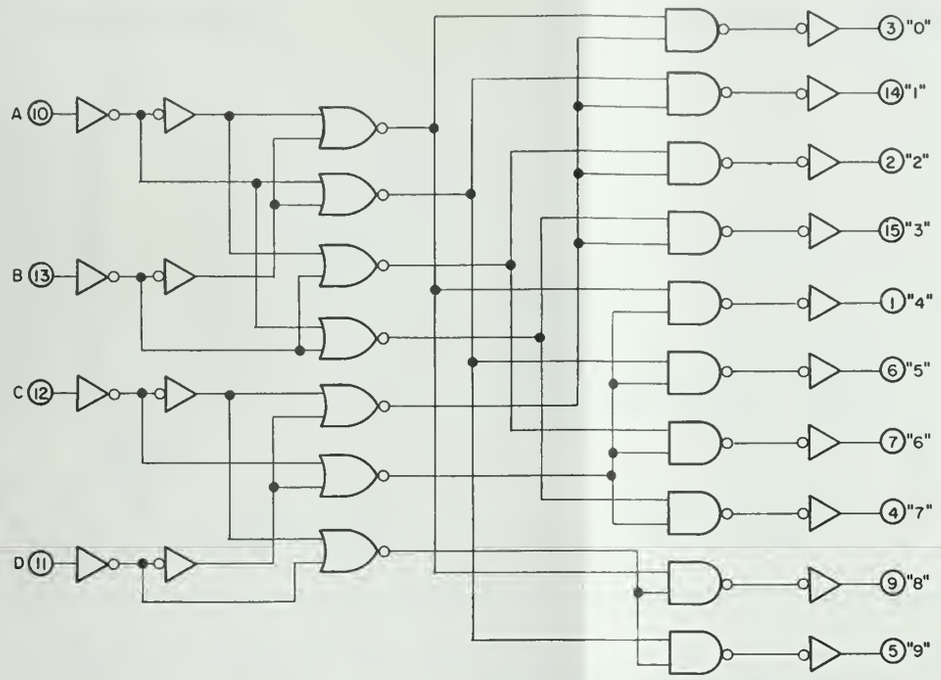
UTH TABLE

PUT	OUTPUT
2	3
0	1
0	0
1	0
1	0

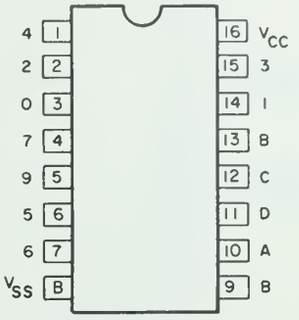
ces a logical
"1" output

7100339 — CD4028BF (3)
CMOS BCD-TO-DECIMAL DECODER

LOGIC DIAGRAM



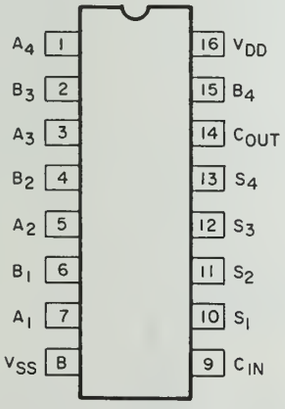
PIN CONFIGURATION



TOP VIEW

7100343 — CD4008
4-BIT ADDER

PIN ASSIGNMENT



This element is a CMOS 4-bit full-adder IC in a hermetically sealed 16-pin dual in-line package.

TRUTH TABLE

A_I	B_I	C_I	C_O	SUM
0	0	0	0	0
1	0	0	0	1
0	1	0	0	1
1	1	0	1	0
0	0	1	0	1
1	0	1	1	0
0	1	1	1	0
1	1	1	1	1

7100344 — CD40192BF/3
CMOS SYNCHRONOUS 4-BIT UP/DOWN DECADE COUNTER

PIN CONFIGURATION

This element is a synchronous 4-bit up/down decade counter IC hermetically sealed in a 16-pin dual in-line package.

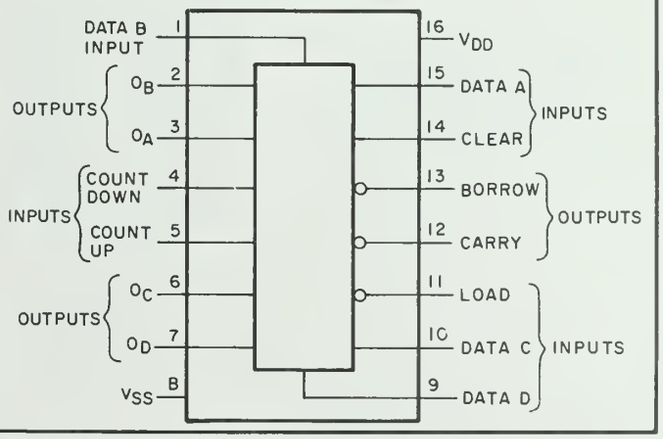
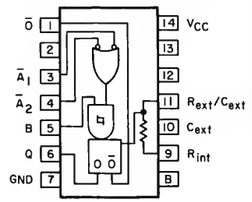


Figure 10-33. Integrated Circuit Data (Sheet 5 of 9)

7100318 — S54121F (883B)
MONOSTABLE MULTIVIBRATOR

PIN CONFIGURATION



MODE FUNCTION — TRUTH TABLE

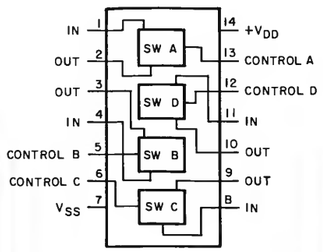
INPUTS			OUTPUTS	
$\overline{A}_1$	$\overline{A}_2$	B	O	$\overline{O}$
L	X	H	L	H
X	L	H	L	H
X	X	L	L	H
H	H	X	L	H
H	↓	H	⎍	⎎
↓	H	H	⎍	⎎
↓	↓	H	⎍	⎎
L	X	↑	⎍	⎎
X	L	↑	⎍	⎎

H = HIGH VOLTAGE LEVEL
L = LOW VOLTAGE LEVEL
X = DON'T CARE
↑ = LOW-TO-HIGH TRANSITION
↓ = HIGH-TO-LOW TRANSITION

This element is a monostable multivibrator with an active HIGH going Schmitt trigger input and two gated active LOW going trigger inputs. The device is non-retriggerable and will not react to input transitions while timing out. In response to a trigger, the O output goes high and the $\overline{O}$ output goes low, staying there for a predetermined time and then returning to the initial state.

7100320 — CD4062B
QUAD BI-LATERAL SWITCH

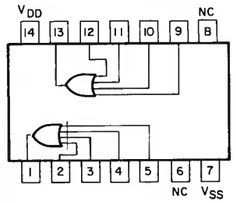
LOGIC DIAGRAM



This element consists of four independent switches capable of controlling either digital or analog signals. This quad bi-lateral switch is useful in signal gating, chopper, modulator, demodulator and CMOS Logic Implementation.

7100336 — CD002BF (3)
CMOS DUAL 4-INPUT NOR GATE

LOGIC DIAGRAM



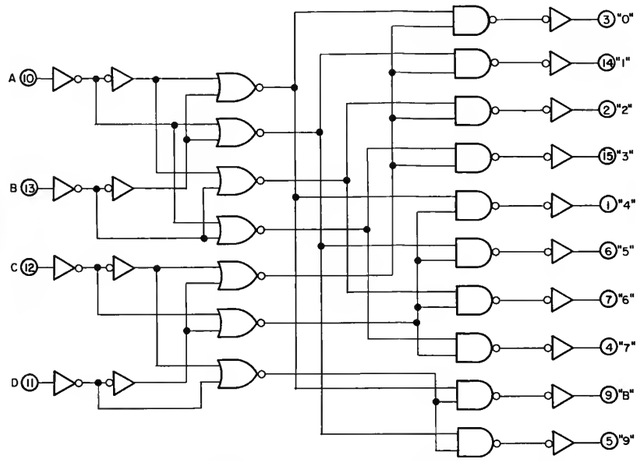
TRUTH TABLE

INPUT		OUTPUT
1	2	3
0	0	1
1	0	0
0	1	0
1	1	0

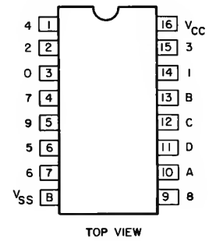
This element is a dual 4-input NOR gate. Each gate produces a logical "0" output when one or more of its inputs are "1" and a "1" output when both inputs are "0".

7100339 — CD4028BF (3)
CMOS BCD-TO-DECIMAL DECODER

LOGIC DIAGRAM

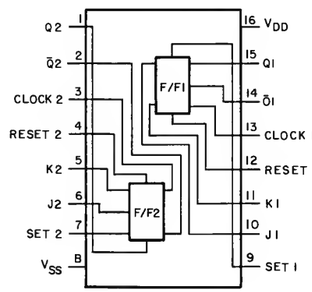


PIN CONFIGURATION



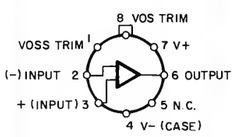
7100341 — CD4027B
DUAL J-K MASTER/SLAVE FLIP-FLOP WITH SET AND RESET

LOGIC DIAGRAM



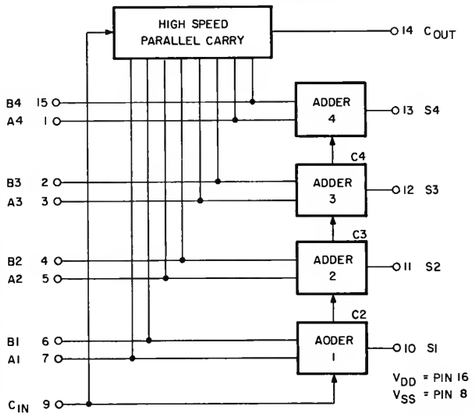
This element is a J-K flip flop hermetically sealed in a 16-pin dual in-line package.

7100342 — OP-05-883J
OPERATIONAL AMPLIFIER



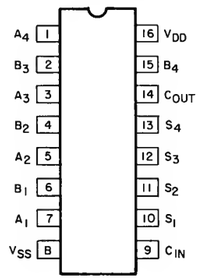
This element is a Type OP-05 instrumentation operational amplifier IC hermetically sealed in a metal can package.

FUNCTIONAL DIAGRAM



7100343 — CD4008
4-BIT ADDER

PIN ASSIGNMENT



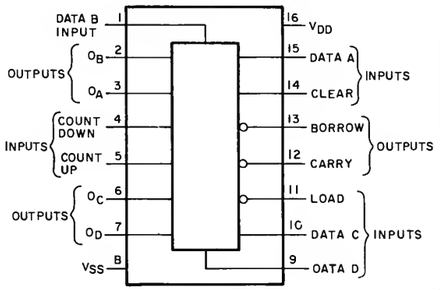
This element is a CMOS 4-bit full-adder IC in a hermetically sealed 16-pin dual in-line package.

TRUTH TABLE

A_I	B_I	C_I	C_O	SUM
0	0	0	0	0
1	0	0	0	1
0	1	0	0	1
1	1	0	1	0
0	0	1	0	1
1	0	1	1	0
0	1	1	1	0
1	1	1	1	1

7100344 — CD40192BF/3
CMOS SYNCHRONOUS 4-BIT UP/DOWN DECADE COUNTER

PIN CONFIGURATION

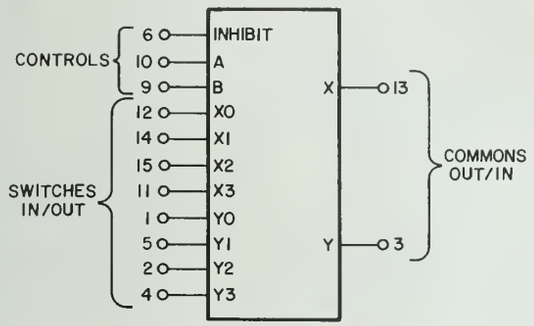


This element is a synchronous 4-bit up/down decade counter IC hermetically sealed in a 16-pin dual in-line package.

Figure 10-33. Integrated Circuit Data (Sheet 5 of 9)

7100348 – CD4052B/F3
DUAL 4-CHANNEL MULTIPLEXER/ DEMULTIPLEXER

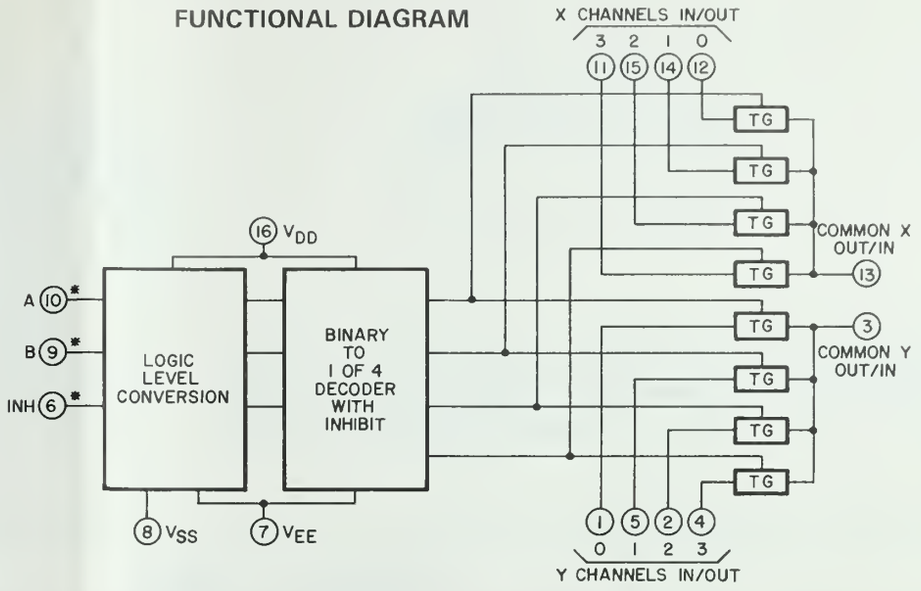
PIN CONFIGURATION



V_{DD} = PIN 16
V_{SS} = PIN 8
V_{EE} = PIN 7

This element is a CMOS differential 6-channel analog multiplexer/demultiplexer IC in a hermetically sealed 16-pin dual in-line package.

FUNCTIONAL DIAGRAM



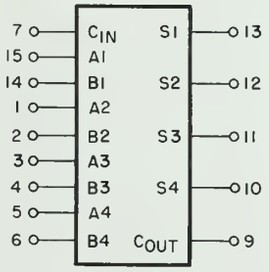
7100352 – MC14560-BBEBS
CMOS ADDER

TRUTH TABLE *

INPUT									OUTPUT				
A4	A3	A2	A1	B4	B3	B2	B1	C_{IN}	C_{OUT}	S4	S3	S2	S1
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	1
0	1	0	0	0	0	1	1	0	0	0	1	1	1
0	1	0	0	0	0	1	1	1	0	1	0	0	0
0	1	1	1	0	1	0	0	0	1	0	0	0	1
0	1	1	1	0	1	0	0	1	1	0	0	1	0
1	0	0	0	0	1	0	1	0	1	0	0	1	1
0	1	1	0	1	0	0	0	0	1	0	1	0	0
1	0	0	1	1	0	0	1	1	1	1	0	0	1

*PARTIAL TRUTH TABLE TO SHOW LOGIC OPERATION FOR REPRESENTATIVE INPUT VALUES.

BLOCK DIAGRAM



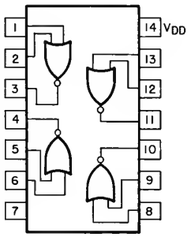
V_{DD} = PIN 16
V_{SS} = PIN 8

This element is a CMOS Natural Binary Coded Decimal (NBCD) adder IC hermetically sealed in a 16-pin dual in-line package.

Figure 10-33. Integrated Circuit Data (Sheet 6 of 9)

7100345 – CD4001BF/3
QUAD 2-INPUT NOR GATE

LOGIC DIAGRAM



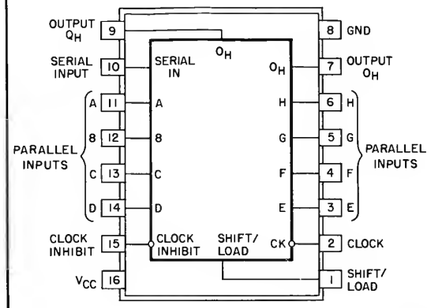
TRUTH TABLE

INPUT		OUTPUT
1	2	3
1	1	0
1	0	1
0	1	1
0	0	1

This element is a quad 2-input NOR gate. Each gate provides a logic "0" output when all inputs are "1" and a "1" output if any of the inputs are "0."

7100346 – SNC54LS165J
PARALLEL-LOAD 8-BIT SHIFT REGISTER

PIN CONFIGURATION



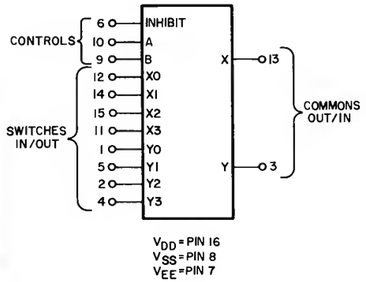
FUNTION TABLE

INPUTS					INTERNAL OUTPUTS		OUTPUT
SHIFT/ LOAD	CLOCK INHIBIT	CLOCK	SERIAL	PARALLEL A ... H	Q_A	Q_B	Q_H
L	X	X	X	a ... h	a	b	h
H	L	L	X	X	Q_{AO}	Q_{BO}	Q_{HO}
H	L	↑	H	X	H	Q_{An}	Q_{Gn}
H	L	↑	L	X	L	Q_{An}	Q_{Gn}
H	H	X	X	X	Q_{AO}	Q_{BO}	Q_{HO}

This element is a low power Schottky parallel load 8-bit shift register IC hermetically sealed in a 16-pin dual in-line package.

7100348 – CD4052B/F3
DUAL 4-CHANNEL MULTIPLEXER/ DEMULTIPLEXER

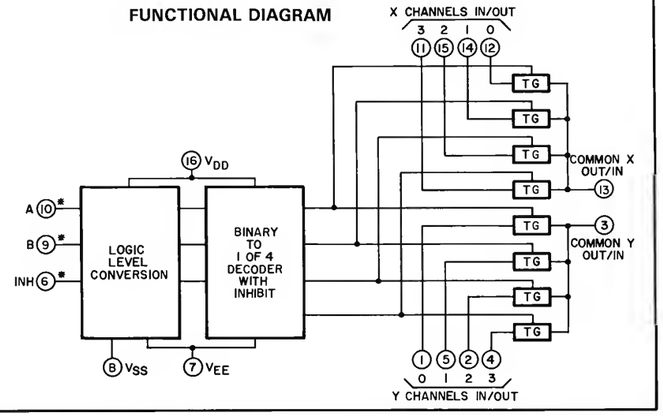
PIN CONFIGURATION



V_{DD} = PIN 16
V_{SS} = PIN 8
V_{EE} = PIN 7

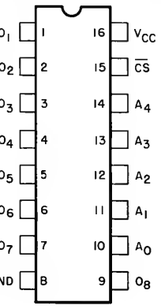
This element is a CMOS differential 6-channel analog multiplexer/demultiplexer IC in a hermetically sealed 16-pin dual in-line package.

FUNCTIONAL DIAGRAM

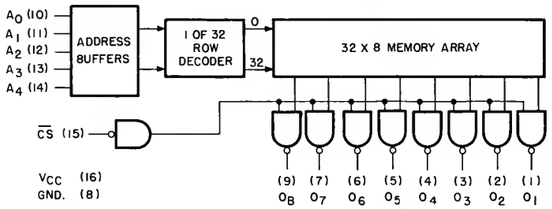


7100350 – HM17602B-8
BIPOLAR 32 X 8 PROM

N CONFIGURATION



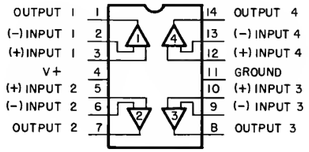
FUNCTIONAL DIAGRAM



This element is a bipolar 32 x 8 PROM (open collector) IC hermetically sealed in a 16-pin dual in-line package.

7100351 – LM124
QUAD OPERATIONAL AMPLIFIER

LOGIC DIAGRAM



This element is a low power quad operational amplifier IC hermetically sealed in a 14-pin dual in-line package.

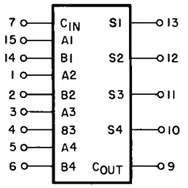
7100352 – MC14560-BBEBS
CMOS ADDER

TRUTH TABLE *

INPUT									OUTPUT				
A4	A3	A2	A1	B4	B3	B2	B1	C_{IN}	C_{OUT}	S4	S3	S2	S1
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	1
0	1	0	0	0	0	0	1	0	0	0	0	1	1
0	1	0	0	0	0	0	1	1	0	0	1	0	0
0	1	1	1	0	1	0	0	0	0	1	0	0	1
0	1	1	1	0	1	0	0	1	1	0	0	1	0
1	0	0	0	0	1	0	1	0	1	0	0	1	1
0	1	1	0	1	0	0	0	0	1	0	1	0	0
1	0	0	1	1	0	0	1	1	1	1	0	0	1

*PARTIAL TRUTH TABLE TO SHOW LOGIC OPERATION FOR REPRESENTATIVE INPUT VALUES.

BLOCK DIAGRAM



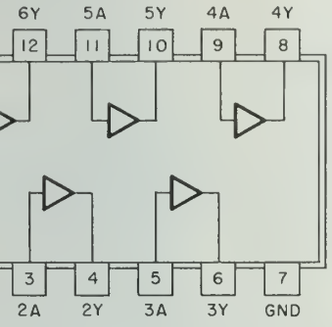
V_{DD} = PIN 16
V_{SS} = PIN 8

This element is a CMOS Natural Binary Coded Decimal (NBCD) adder IC hermetically sealed in a 16-pin dual in-line package.

Figure 10-33. Integrated Circuit Data (Sheet 6 of 9)

NC5407
DRIVER

OGIC DIAGRAM



Y = A

4LS251F
MULTIPLEXER

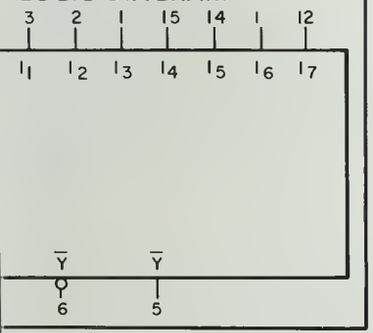
TRUTH TABLE

INPUTS								OUTPUTS	
0	I1	I2	I3	I4	I5	I6	I7	Y	Y
	X	X	X	X	X	X	X	(Z)	(Z)
	X	X	X	X	X	X	X	H	L
	X	X	X	X	X	X	X	L	H
	L	X	X	X	X	X	X	H	L
	H	X	X	X	X	X	X	L	H
	X	L	X	X	X	X	X	H	L
	X	H	X	X	X	X	X	L	H
	X	X	L	X	X	X	X	H	L
	X	X	H	X	X	X	X	L	H
	X	X	X	L	X	X	X	H	L
	X	X	X	H	X	X	X	L	H
	X	X	X	X	L	X	X	H	L
	X	X	X	X	H	X	X	L	H
	X	X	X	X	X	L	X	H	L
	X	X	X	X	X	H	X	L	H
	X	X	X	X	X	X	L	H	L
	X	X	X	X	X	X	H	L	H

GE LEVEL
GE LEVEL

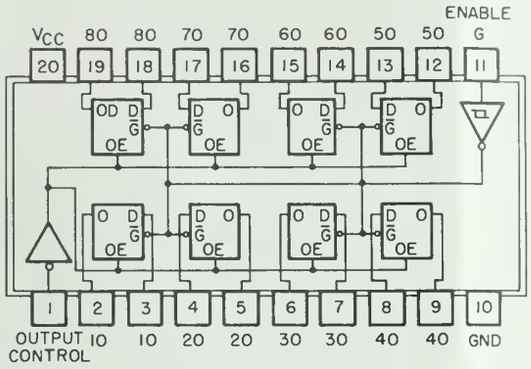
ANCE (OFF)

LOGIC DIAGRAM



7100360-1 — 4260016 (54LS373)
OCTAL D-TYPE TRANSPARENT LATCHES AND EDGE TRIGGERED FLIP-FLOPS

LOGIC DIAGRAM



TRUTH TABLE

OUTPUT CONTROL	ENABLE G	D	OUTPUT
L	H	H	H
L	H	L	L
L	L	X	Q_0
H	X	X	Z

This element is an octal, D-type transparent latch and edge triggered flip-flop. It is an 8-bit register with totem-pole three-state outputs. The eight latches are transparent D-type latches meaning that while the enable (G) is high the Q outputs will follow the data (D) inputs. When the enable is taken low the output will be latched at the level of the data that was setup.

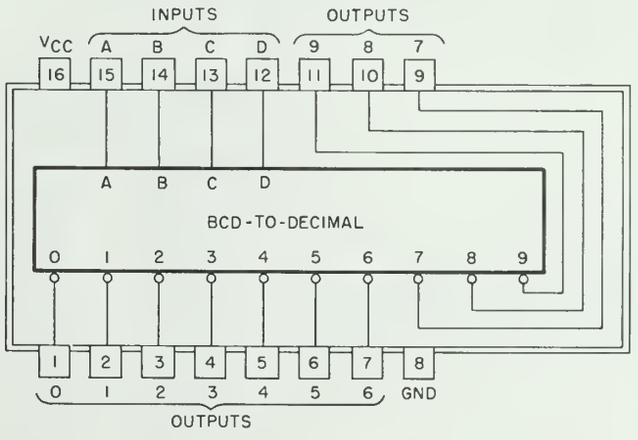
7100363 — SNC5445J
BCD DECODER

FUNCTION TABLE

NO.	INPUTS				OUTPUTS									
	D	C	B	A	0	1	2	3	4	5	6	7	8	9
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	H	L	H	H	H	H	H	H	H	H
2	L	L	H	L	H	H	L	H	H	H	H	H	H	H
3	L	L	H	H	H	H	H	L	H	H	H	H	H	H
4	L	H	L	L	H	H	H	H	L	H	H	H	H	H
5	L	H	L	H	H	H	H	H	H	L	H	H	H	H
6	L	H	H	L	H	H	H	H	H	H	L	H	H	H
7	L	H	H	H	H	H	H	H	H	H	H	L	H	H
8	H	L	L	L	H	H	H	H	H	H	H	H	L	H
9	H	L	L	H	H	H	H	H	H	H	H	H	H	L
INVALID	H	L	H	L	H	H	H	H	H	H	H	H	H	H
	H	L	H	H	H	H	H	H	H	H	H	H	H	H
	H	H	L	L	H	H	H	H	H	H	H	H	H	H
	H	H	L	H	H	H	H	H	H	H	H	H	H	H
	H	H	H	L	H	H	H	H	H	H	H	H	H	H
	H	H	H	H	H	H	H	H	H	H	H	H	H	H

H = HIGH LEVEL (OFF) L = LOW LEVEL (ON)

LOGIC DIAGRAM

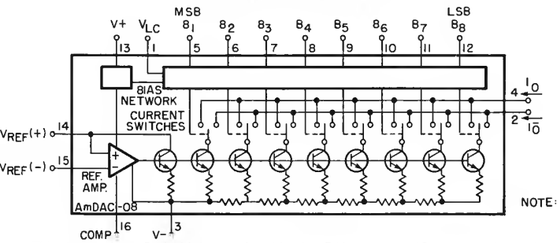


This element is a BCD-to-decimal decoder/driver integrated circuit hermetically sealed in a 16-pin dual in-line package.

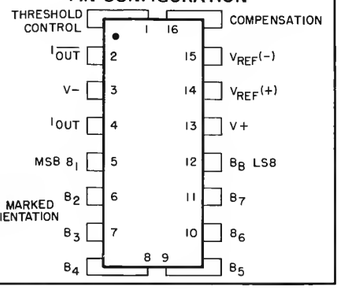
Figure 10-33. Integrated Circuit Data (Sheet 7 of 9)

7100355 — DAC-08A08
8-BIT, HIGH-SPEED MULTIPLE DIGITAL-TO-ANALOG CONVERTER

FUNCTIONAL DIAGRAM



PIN CONFIGURATION

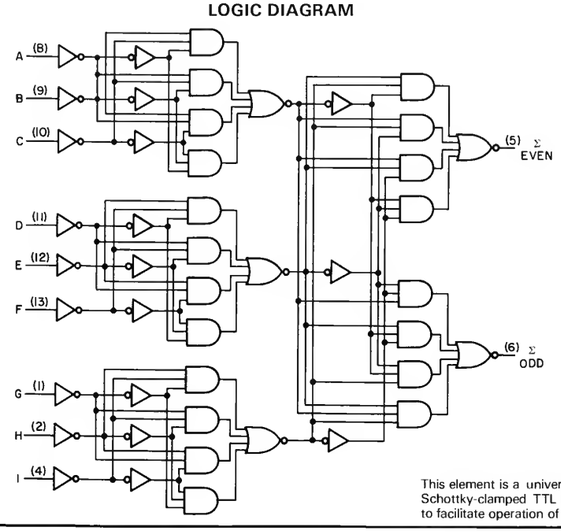


NOTE: PIN 1 IS MARKED FOR ORIENTATION

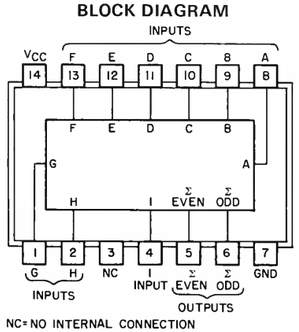
This element is an 8-bit, high-speed multiplying D/A converter IC hermetically sealed in a 16-pin in-line package.

7100356-1 — 4260015 (54LS280)
9-BIT ODD/EVEN PARITY GENERATOR/CHECKER

LOGIC DIAGRAM



BLOCK DIAGRAM



NC = NO INTERNAL CONNECTION

TRUTH TABLE

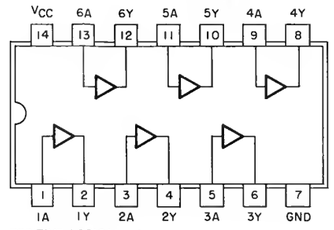
NUMBER OF INPUTS A THRU I THAT ARE HIGH	OUTPUTS	
	Σ EVEN	Σ ODD
0,2,4,6,8	H	L
1,3,5,7,9	L	H

H = HIGH LEVEL, L = LOW LEVEL

This element is a universal, monolithic, nine-bit parity generator/checker. It utilizes Schottky-clamped TTL high-performance circuitry and features odd/even outputs to facilitate operation of either odd or even parity application.

7100357 — SNC5407
HEX BUFFER DRIVER

LOGIC DIAGRAM



POSITIVE LOGIC: Y = A

This element is a hex buffer/driver with open collector and high voltage outputs IC hermetically sealed in a 14-pin dual in-line package.

7100358 — 54LS251F
DATA SELECTOR/MULTIPLEXER

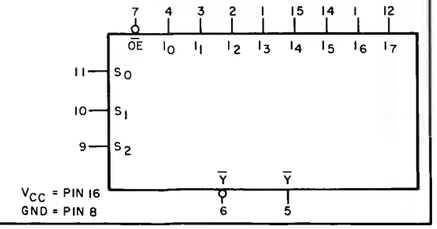
TRUTH TABLE

INPUTS												OUTPUTS	
$\overline{OE}$	S_2	S_1	S_0	I_0	I_1	I_2	I_3	I_4	I_5	I_6	I_7	$\overline{Y}$	$\overline{Y}$
H	X	X	X	X	X	X	X	X	X	X	X	(Z)	(Z)
L	L	L	L	L	X	X	X	X	X	X	X	H	L
L	L	L	L	H	X	X	X	X	X	X	X	L	H
L	L	L	H	X	L	X	X	X	X	X	X	H	L
L	L	L	H	X	H	X	X	X	X	X	X	L	H
L	L	H	L	X	X	L	X	X	X	X	X	H	L
L	L	H	L	X	X	H	X	X	X	X	X	L	H
L	L	H	H	X	X	X	L	X	X	X	X	H	L
L	L	H	H	X	X	X	H	X	X	X	X	L	H
L	H	L	L	X	X	X	X	L	X	X	X	H	L
L	H	L	L	X	X	X	X	H	X	X	X	L	H
L	H	L	H	X	X	X	X	X	L	X	X	H	L
L	H	L	H	X	X	X	X	X	H	X	X	L	H
L	H	H	L	X	X	X	X	X	X	L	X	H	L
L	H	H	L	X	X	X	X	X	X	H	X	L	H
L	H	H	H	X	X	X	X	X	X	X	L	H	L
L	H	H	H	X	X	X	X	X	X	X	H	L	H

H = HIGH VOLTAGE LEVEL
L = LOW VOLTAGE LEVEL
X = DON'T CARE
(Z) = HIGH IMPEDANCE (OFF)

This element is a low power Schottky data selector/multiplexer with 3-state outputs IC hermetically sealed in a 16-pin dual in-line package.

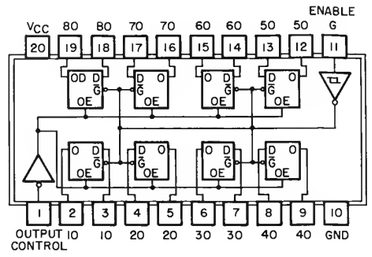
LOGIC DIAGRAM



V_{CC} = PIN 16
GND = PIN 8

7100360-1 — 4260016 (54LS373)
OCTAL D-TYPE TRANSPARENT LATCHES AND EDGE TRIGGERED FLIP-FLOPS

LOGIC DIAGRAM



TRUTH TABLE

OUTPUT CONTROL	ENABLE G	D	OUTPUT
L	H	H	H
L	H	L	L
L	L	X	Q_0
H	X	X	Z

This element is an octal, D-type transparent latch and edge triggered flip-flop. It is an 8-bit register with totem-pole three-state outputs. The eight latches are transparent D-type latches meaning that while the enable (G) is high the Q outputs will follow the data (D) inputs. When the enable is taken low the output will be latched at the level of the data that was setup.

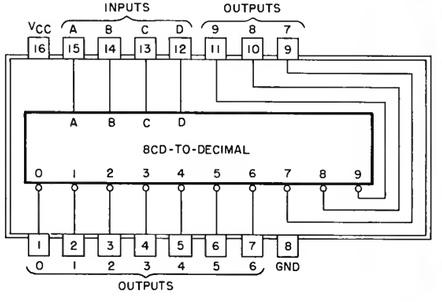
7100363 — SNC5445J
BCD DECODER

FUNCTION TABLE

NO.	INPUTS				OUTPUTS									
	D	C	8	A	0	1	2	3	4	5	6	7	8	9
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	H	L	H	H	H	H	H	H	H	H
2	L	L	H	L	H	H	L	H	H	H	H	H	H	H
3	L	L	H	H	H	H	H	L	H	H	H	H	H	H
4	L	H	L	L	H	H	H	H	L	H	H	H	H	H
5	L	H	L	H	H	H	H	H	H	L	H	H	H	H
6	L	H	H	L	H	H	H	H	H	H	L	H	H	H
7	L	H	H	H	H	H	H	H	H	H	H	L	H	H
8	H	L	L	L	H	H	H	H	H	H	H	H	L	H
9	H	L	L	H	H	H	H	H	H	H	H	H	H	L
INVALID	H	L	H	L	H	H	H	H	H	H	H	H	H	H
	H	L	H	H	H	H	H	H	H	H	H	H	H	H
	H	H	L	L	H	H	H	H	H	H	H	H	H	H
	H	H	L	H	H	H	H	H	H	H	H	H	H	H
	H	H	H	L	H	H	H	H	H	H	H	H	H	H
	H	H	H	H	H	H	H	H	H	H	H	H	H	H

H = HIGH LEVEL (OFF) L = LOW LEVEL (ON)

LOGIC DIAGRAM



This element is a BCD-to-decimal decoder/driver integrated circuit hermetically sealed in a 16-pin dual in-line package.

Figure 10-33. Integrated Circuit Data (Sheet 7 of 9)

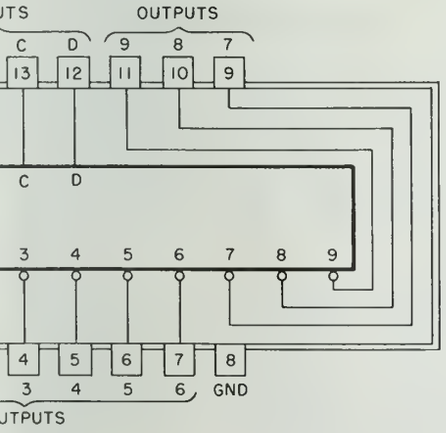
7100442 – S5442F (883B)
4-LINE TO 10-LINE DECODER

FUNCTION TABLE

'LS42 UT	'43A, 'L43 EXCESS-3-INPUT				'44A, 'L44 EXCESS-3-GRAY INPUT				ALL TYPES DECIMAL OUTPUT									
A	D	C	B	A	D	C	B	A	0	1	2	3	4	5	6	7	8	9
L	L	L	H	H	L	L	H	L	L	H	H	H	H	H	H	H	H	H
H	L	H	L	L	L	H	H	L	H	L	H	H	H	H	H	H	H	H
L	L	H	L	H	L	H	H	H	H	H	L	H	H	H	H	H	H	H
H	L	H	H	L	L	H	L	H	H	H	H	L	H	H	H	H	H	H
L	L	H	H	H	L	H	L	L	H	H	H	H	L	H	H	H	H	H
H	H	L	L	L	H	H	L	L	H	H	H	H	H	L	H	H	H	H
L	H	L	L	H	H	H	L	H	H	H	H	H	H	H	L	H	H	H
H	H	L	H	L	H	H	H	H	H	H	H	H	H	H	H	L	H	H
L	H	L	H	H	H	H	H	L	H	H	H	H	H	H	H	H	L	H
H	H	H	L	L	H	L	H	L	H	H	H	H	H	H	H	H	H	L
L	H	H	L	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H
H	H	H	H	L	H	L	L	H	H	H	H	H	H	H	H	H	H	H
L	H	H	H	H	H	L	L	L	H	H	H	H	H	H	H	H	H	H
H	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H
L	L	L	L	H	L	L	L	H	H	H	H	H	H	H	H	H	H	H
H	L	L	H	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H

evel

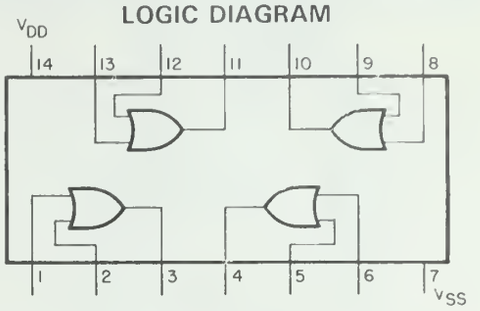
LOGIC DIAGRAM



This element is a 4-line to 10-line decoder IC in a 16-pin dual in-line package. These monolithic decimal decoders consist of eight inverters and ten four-input NAND gates. The inverters are connected in pairs to make BCD input data available for decoding by the NAND gates. Full decoding of valid input logic ensures that all outputs remain off for all invalid input conditions.

7100443 – CD4071B
QUAD 2-INPUT OR GATE

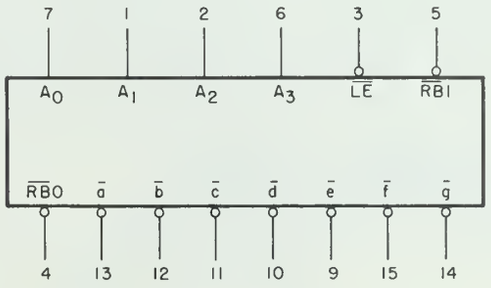
LOGIC DIAGRAM



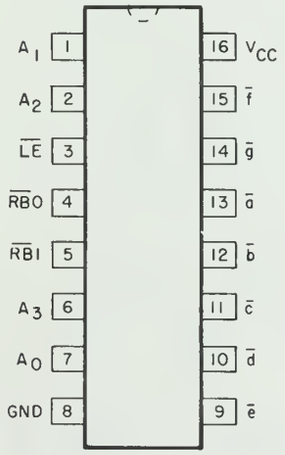
This element is a quad 2-input OR buffered gate. It produces a logical "1" output when one of its inputs is logical "1" and a logical "0" output when both of its inputs are "0".

7100444 – 9370
7-SEGMENT DECODER/DRIVER

LOGIC SYMBOL



PIN CONFIGURATION

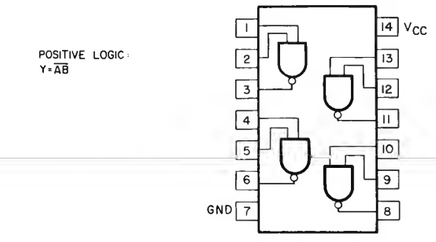


This element is a 7-segment decoder/driver/latch IC hermetically sealed in a 16-pin dual in-line cermanic package.

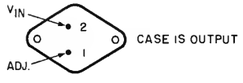
Figure 10-33. Integrated Circuit Data (Sheet 8 of 9)

7100364-1 – 4260016 (54LS132)
QUADRUPLE 2-INPUT POSITIVE-NAND SCHMITT TRIGGER

LOGIC DIAGRAM

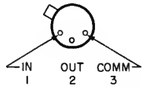


7100370 – LM117K
ADJUSTABLE VOLTAGE REGULATOR



This element is a 3-terminal adjustable regulator hermetically sealed in a metal can package (TO-3).

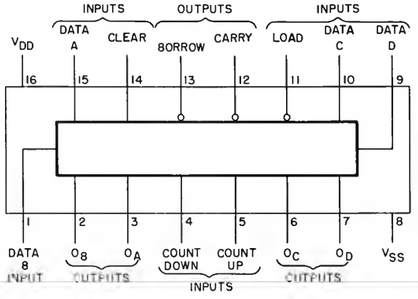
7100371 – μA7812H
VOLTAGE REGULATOR, +12V, 0.5A



This element is a 2-terminal positive voltage regulator in a hermetically sealed metal can package (TO-39).

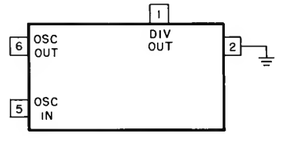
7100372 – CD40193BF/3
SYNC, 4-BIT UP/DOWN DECADE COUNTER

LOGIC DIAGRAM



This element is a synchronous 4-bit up/down decade counter IC hermetically sealed in a 16-pin dual in-line package.

7100373 – 34333 (SG1526)MM5369
REGULATING PULSE WIDTH MODULATOR



This element is a pulse width modulator hermetically sealed in an 18-pin dual in-line package.

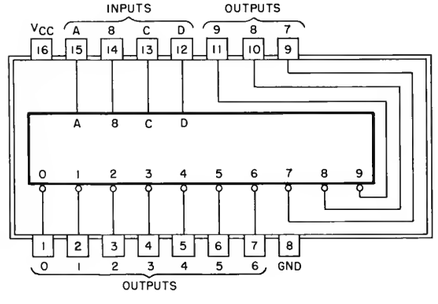
7100442 – S5442F (883B)
4-LINE TO 10-LINE DECODER

FUNCTION TABLE

NO.	'42A, 'L42, 'LS42 BCD INPUT				'43A, 'L43 EXCESS-3-INPUT				'44A, 'L44 EXCESS-3-GRAY INPUT				ALL TYPES DECIMAL OUTPUT									
	D	C	B	A	D	C	B	A	D	C	B	A	0	1	2	3	4	5	6	7	8	9
0	L	L	L	L	L	L	H	H	L	L	H	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	L	H	L	L	L	H	H	L	H	L	H	H	H	H	H	H	H	H
2	L	L	H	L	L	H	L	H	L	H	H	H	H	H	L	H	H	H	H	H	H	H
3	L	L	H	H	L	H	H	L	L	H	L	H	H	H	H	L	H	H	H	H	H	H
4	L	H	L	L	L	H	H	H	L	H	L	L	H	H	H	H	L	H	H	H	H	H
5	L	H	L	H	H	L	L	L	H	H	L	L	H	H	H	H	H	L	H	H	H	H
6	L	H	H	L	H	L	L	H	H	H	L	H	H	H	H	H	H	H	L	H	H	H
7	L	H	H	H	H	L	H	L	H	H	H	H	H	H	H	H	H	H	H	L	H	H
8	H	L	L	L	H	L	H	H	H	H	H	L	H	H	H	H	H	H	H	H	L	H
9	H	L	L	H	H	H	L	L	H	L	H	L	H	H	H	H	H	H	H	H	H	L
INVALID	H	L	H	L	H	H	L	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H
	H	L	H	H	H	H	H	L	H	L	L	H	H	H	H	H	H	H	H	H	H	H
	H	H	L	L	H	H	H	H	H	L	L	L	H	H	H	H	H	H	H	H	H	H
	H	H	L	H	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H
	H	H	H	L	L	L	L	H	L	L	L	H	H	H	H	H	H	H	H	H	H	H
	H	H	H	H	L	L	H	L	L	L	H	L	H	H	H	H	H	H	H	H	H	H

H = high level, L = low level

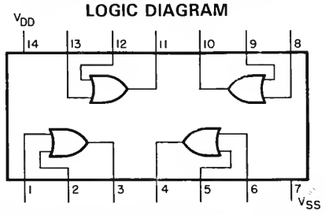
LOGIC DIAGRAM



This element is a 4-line to 10-line decoder IC in a 16-pin dual in-line package. These monolithic decimal decoders consist of eight inverters and ten four-input NAND gates. The inverters are connected in pairs to make BCD input data available for decoding by the NAND gates. Full decoding of valid input logic ensures that all outputs remain off for all invalid input conditions.

7100443 – CD4071B
QUAD 2-INPUT OR GATE

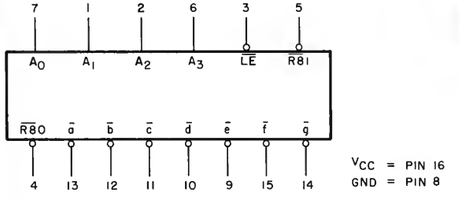
LOGIC DIAGRAM



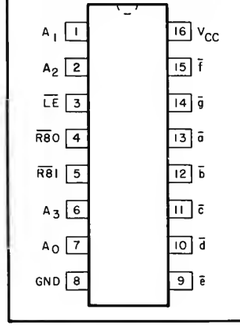
This element is a quad 2-input OR buffered gate. It produces a logical "1" output when one of its inputs is logical "1" and a logical "0" output when both of its inputs are "0".

7100444 – 9370
7-SEGMENT DECODER/DRIVER

LOGIC SYMBOL



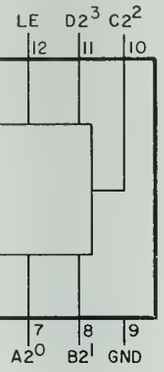
PIN CONFIGURATION



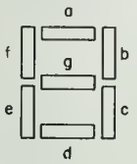
This element is a 7-segment decoder/driver/latch IC hermetically sealed in a 16-pin dual in-line cermanic package.

Figure 10-33. Integrated Circuit Data (Sheet 8 of 9)

TION

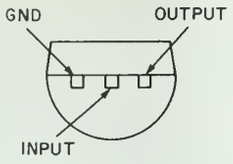


SEGMENT IDENTIFICATION



This element is a CMOS 7-segment to BCD converter IC in a hermetically sealed 18-pin ceramic dual in-line package.

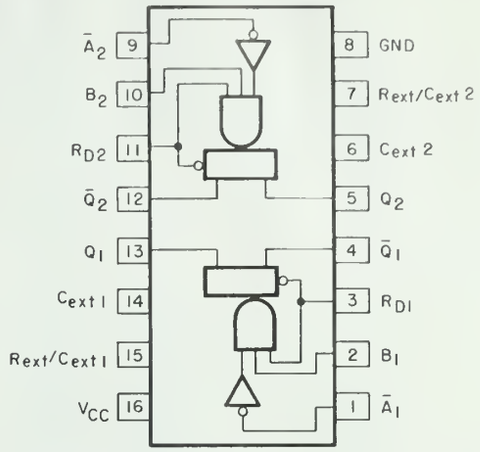
7100452 – LM320H-12 VOLTAGE REGULATOR, -12V, 0.5A



This element is a -12-volt regulator hermetically sealed in a TO-5 metal can. The regulator has a current capability of 0.5A.

7100453 – SNJ54123J MONOSTABLE MULTIVIBRATOR

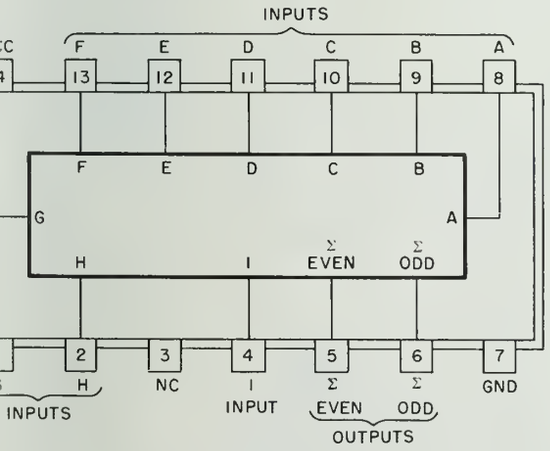
LOGIC DIAGRAM



This element is a retriggerable monostable multivibrator, featuring dc triggering from gated active LOW inputs ($\bar{A}$) and active HIGH inputs (B) and also provide overriding direct reset inputs. Complementary outputs are provided. The retrigger capability simplifies the generation of output pulses of extremely long duration. By triggering the input before the output pulse is terminated, the output pulse may be extended. The overriding reset capability permits any output pulse to be terminated at a predetermined time independently of the timing components R and C.

7100459 – SNJ54S280J PARITY GENERATOR

PIN CONFIGURATION



FUNCTION TABLE

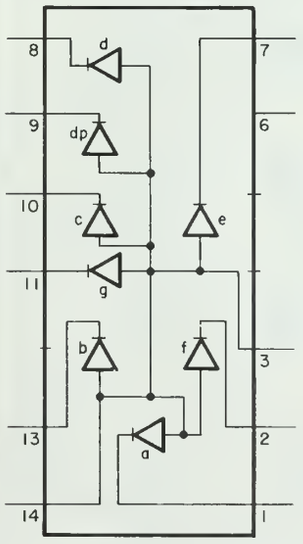
NUMBER OF INPUTS A THRU I THAT ARE HIGH	OUTPUTS Σ EVEN	OUTPUTS Σ ODD
0, 2, 4, 6, 8	H	L
1, 3, 5, 7, 9	L	H

H = HIGH LEVEL
L = LOW LEVEL

This element is a Schottky 9-bit odd/even parity generator/checker IC in a hermetically sealed 14-pin dual in-line package.

7230023 – HDSP-3531 SEVEN-SEGMENT DISPLAY

LOGIC DIAGRAM

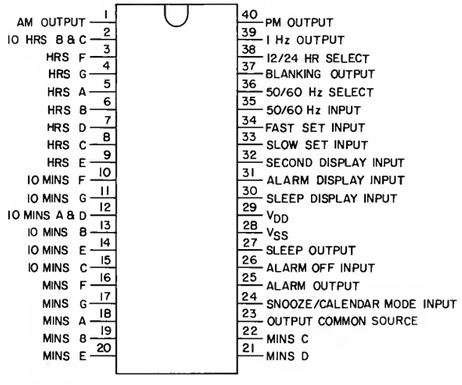


This element is a common anode, 7-segment display hermetically sealed in a 14-pin dual in-line package.

Figure 10-33. Integrated Circuit Data (Sheet 9 of 9)

7100445 – MM73178N
ALARM CLOCK CALCULATOR

PIN CONFIGURATION



This element is an alarm clock calendar IC encapsulated in a high reliability 40-pin dual in-line epoxy package.

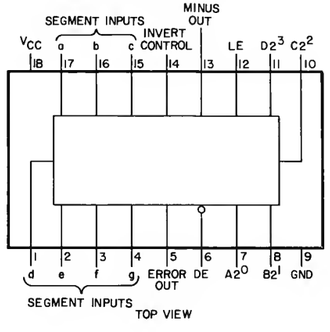
7100446 – MM54C915
7-SEGMENT TO BCD CONVERTER

TRUTH TABLE

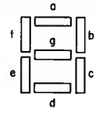
CHARACTER AT SEGMENT INPUTS	BCD OUTPUTS				NON-BCD OUTPUTS	
	D 2^3	C 2^2	B 2^1	A 2^0	ERROR	MINUS
0	0	0	0	0	0	0
I	0	0	0	I	0	0
I	0	0	I	0	0	0
2	0	0	I	I	0	0
3	0	I	0	0	0	0
4	0	I	0	I	0	0
5	0	I	I	0	0	0
6	0	I	I	I	0	0
6	0	I	I	I	0	0
7	0	I	I	I	0	0
8	I	0	0	0	0	0
9	I	0	0	I	0	0
9	I	0	0	I	0	0
	I	0	I	0	0	0
	I	0	I	I	0	I
All other input combinations	X	X	X	X	I	0
	X	X	X	X	I	0

X = TRI-STATE CONDITION

PIN CONFIGURATION

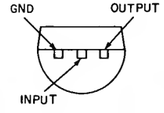


SEGMENT IDENTIFICATION



This element is a CMOS 7-segment to BCD converter IC in a hermetically sealed 18-pin ceramic dual in-line package.

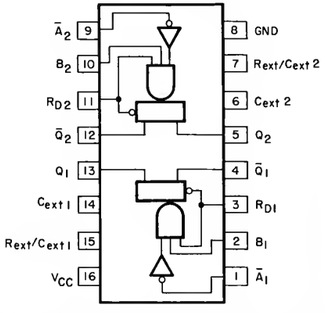
7100452 – LM320H-12
VOLTAGE REGULATOR, -12V, 0.5A



This element is a -12-volt regulator hermetically sealed in a TO-5 metal can. The regulator has a current capability of 0.5A.

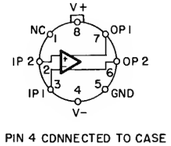
7100453 – SNJ54123J
MONOSTABLE MULTIVIBRATOR

LOGIC DIAGRAM



This element is a retriggerable monostable multivibrator, featuring dc triggering from gated active LOW inputs (Ā) and active HIGH inputs (B) and also provide overriding direct reset inputs. Complementary outputs are provided. The retrigger capability simplifies the generation of output pulses of extremely long duration. By triggering the input before the output pulse is terminated, the output pulse may be extended. The overriding reset capability permits any output pulse to be terminated at a predetermined time independently of the timing components R and C.

7100454 – μA760HMQB
VOLTAGE COMPARATOR

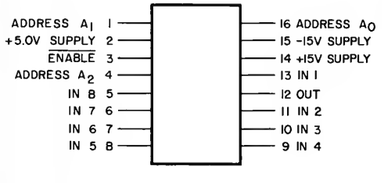


PIN 4 CONNECTED TO CASE

This element is a high-speed differential comparator in an 8-pin metal package.

7100455 – H1-1818A-2
CMOS ANALOG MULTIPLEXER

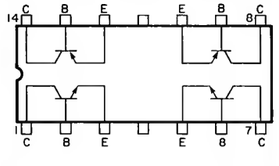
PIN CONFIGURATION



This element is an 8-channel CMOS analog multiplexer in a hermetically sealed 16-pin dual in-line package.

7100456 – MHQ6001
QUAD DUAL INPUT TRANSISTOR

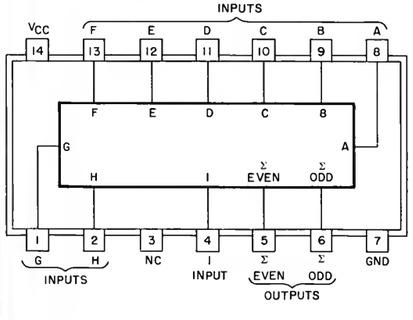
CONNECTION DIAGRAM



This element is quad dual in-line silicon annular complementary transistor pair in a hermetically sealed 14-pin dual in-line package.

7100459 – SNJ54S280J
PARITY GENERATOR

PIN CONFIGURATION



FUNCTION TABLE

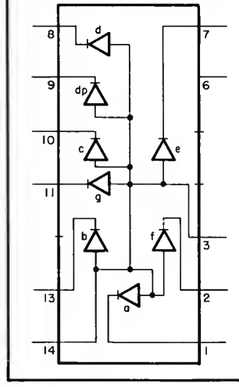
NUMBER OF INPUTS A THRU I THAT ARE HIGH	OUTPUTS Σ EVEN	OUTPUTS Σ ODD
0, 2, 4, 6, 8	H	L
I, 3, 5, 7, 9	L	H

H = HIGH LEVEL
L = LOW LEVEL

This element is a Schottky 9-bit odd/even parity generator/checker IC in a hermetically sealed 14-pin dual in-line package.

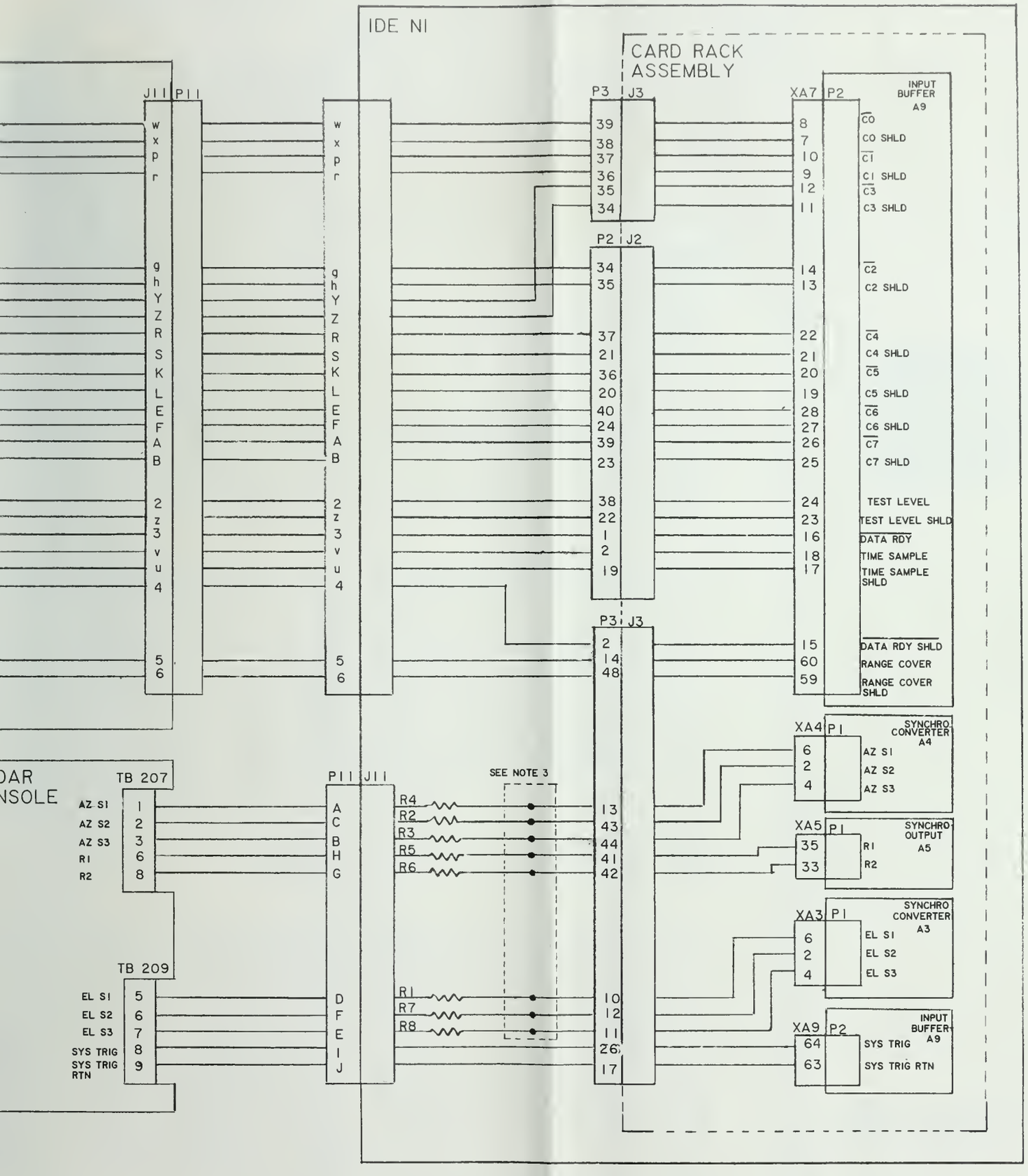
7230023 – HDSP-3531
SEVEN-SEGMENT DISPLAY

LOGIC DIAGRAM



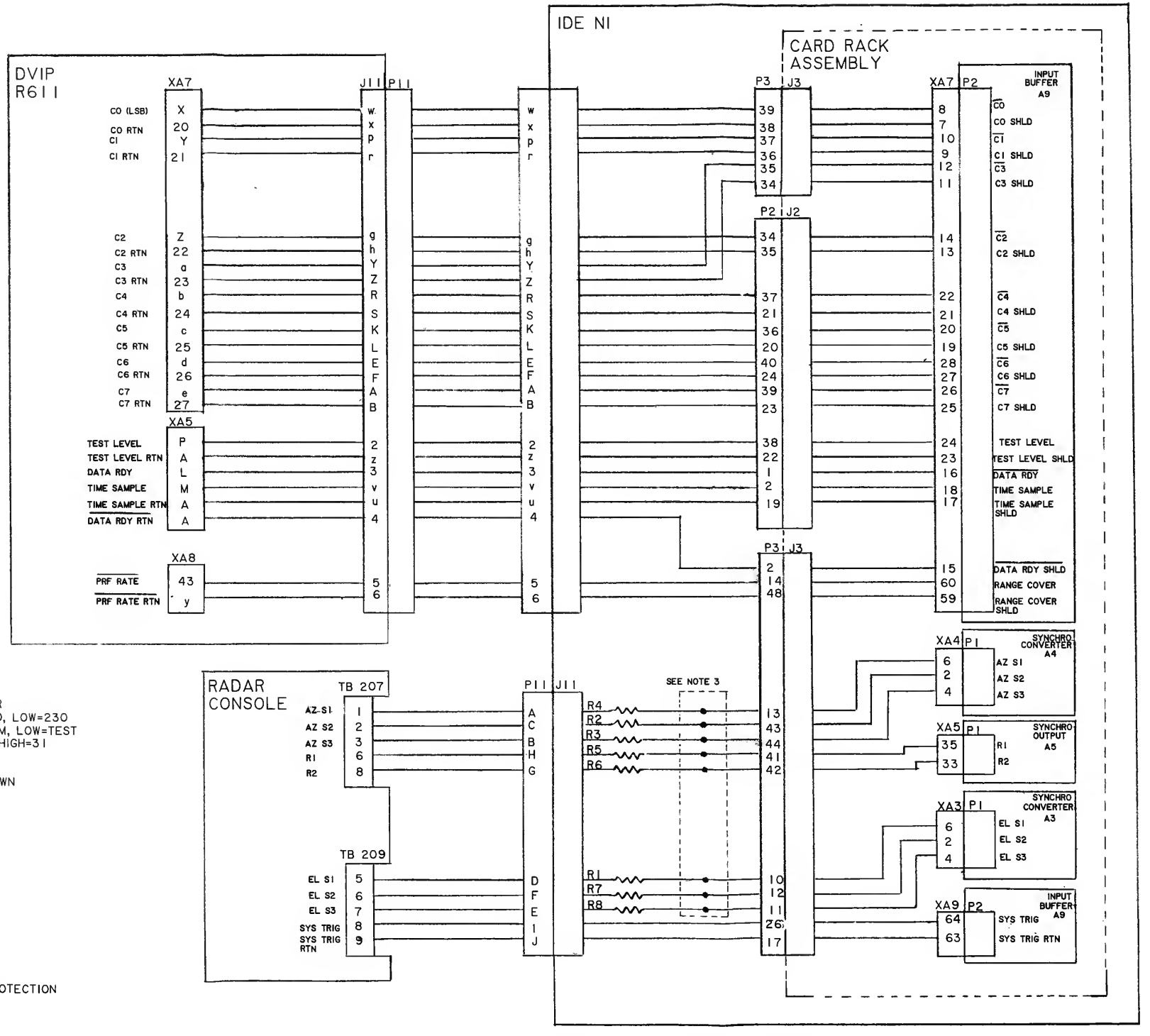
This element is a common anode, 7-segment display hermetically sealed in a 14-pin dual in-line package.

Figure 10-33. Integrated Circuit Data (Sheet 9 of 9)



WIRING DIAGRAM-WR57 RADAR TO R540 IDE

R450-WR57



NOTES:

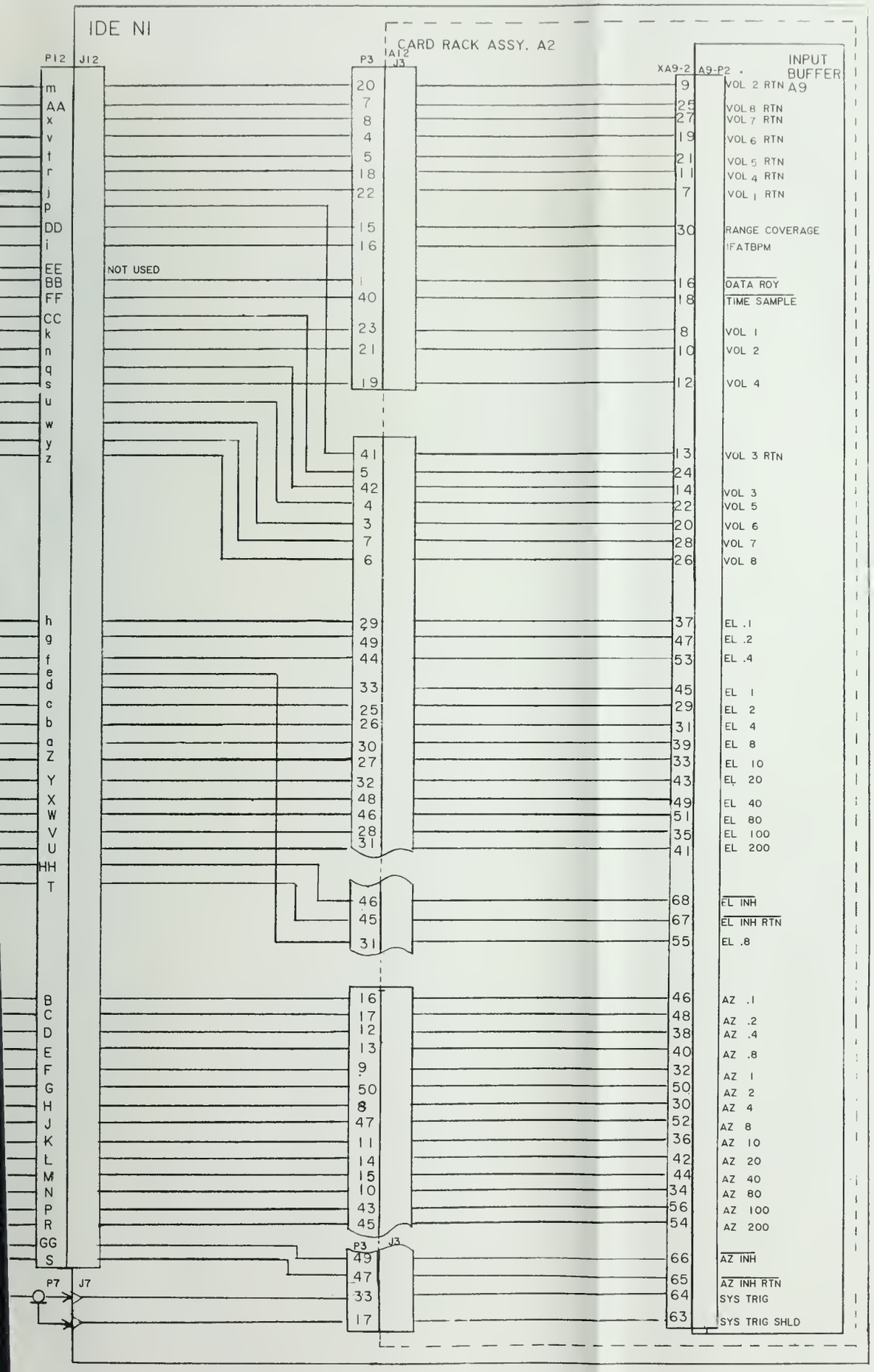
1 A9-2 INPUT FOR RADAR
RANGE COVER:HIGH=450, LOW=230
TEST LEVEL: HIGH=NORM, LOW=TEST
TIME SAMPLE:LOW=15, HIGH=31
DATA RDY:LOW=TRUE

2 CONNECTIONS NOT SHOWN
J3-39 TO J3-23
J3-37 TO J3-21
J2-34 TO J2-42
J3-35 TO J3-19
J2-37 TO J2-4
J2-36 TO J2-3
J2-40 TO J2-7
J2-39 TO J2-6
J2-38 TO J2-5
J2-1 TO J3-1
J2-2 TO J3-40
J3-14 TO J3-15
J3-26 TO J3-33
J3-17 TO J7-(1)

3 SYNCHRO TRANSIENT PROTECTION ASSY. CR1 AND CR2

WIRING DIAGRAM-WR57 RADAR TO R540 IDE

R450-WR57



NOTES:

1. RISM=RANGE INTERVAL SELECT
   =RANGE COVERAGE
2. TSSM=TIME SAMPLE SELECT
3. TEST SIG MON=TEST LEVEL
4. IFAT8PM=IF AT TENUATOR.BYPASS MOOE
5. A9-P2 INPUT FOR 74C RADAR
   RANGE COVERAGE:HIGH=450KM
   TEST LEVEL:HIGH=NORM,LOW=TEST
   TIME SAMPLE:HIGH=15,LOW 31
   IFAT8PM:HIGH=ON LOW=NORMAL
   DATA ROY:LOW=TRUE

WIRING DIAGRAM

WSR74 TO R541 IDE

R451-WSR74

RADAR CONSOLE I

DVIP
1A4

INPUT
BUFFER
A12

P1 XA12

RISM 30
IFAT8PM 34
STCM 32
DATA RDY 35
TSSM 28
VOL 1 4
VOL 2 6
VOL 3 8
VOL 4 9
VOL 5 11
VOL 6 13
VOL 7 16
VOL 8 18

TEST SIG MON S228

J2 P2

VOL 2 RTN X
VOL 8 RTN J
VOL 7 RTN M
VOL 6 RTN P
VOL 5 RTN R
VOL 4 RTN T
VOL 1 RTN Z
VOL 3 RTN V
F B E H G D Y W U S Q N L K

RHI
1A3

INPUT
BUFFER
A12

P1 XA12

EL .1 30
EL .2 28
EL .4 25
EL .8 23
EL .1 21
EL .2 20
EL .4 18
EL 8 16
EL 10 13
EL 20 11
EL 40 9
EL 80 8
EL 100 6
EL 200 4
EL INH 32

J3 P3

o b c d e f g h j k m n p s x

EL INH RTN

PPI
1A2

INPUT
BUFFER
A12

P1 XA12

AZ .1 30
AZ .2 28
AZ .4 25
AZ .8 23
AZ 1 21
AZ 2 20
AZ 4 18
AZ 8 16
AZ 10 13
AZ 20 11
AZ 40 9
AZ 80 8
AZ 100 6
AZ 200 4
AZ INH 32

J3 P3

a b c d e f g h j k m n p r x s k r

AZ INH RTN

RTN { T R K r

J2 P2

m oo x v t r j p. dd i ee bb cc ff k n q s u w y z
h g f e d c b o Z Y X W V U HH
8 C D E F G H J K L M N P R GG S

AA
DD
EE
88
CC
FF

RTN {

P12

SYSTEM TRIGGER

IDE NI

CARD RACK ASSY. A2

P12 J12

m AA x v t r j p DD i EE 88 FF CC k n q s u w y z
h g f e d c b o Z Y X W V U HH T
8 C D E F G H J K L M N P R GG S

P3 J3

NOT USED

20 7 8 4 5 18 22 15 16 1 40 23 21 19

41 5 42 4 3 7 6 29 49 44 33 25 26 30 27 32 48 46 28 31

46 45 31

16 17 12 13 9 50 8 47 11 14 15 10 43 45

P3 J3

49 47 33 17

P7 J7

A12

XA9-2 A9-P2

INPUT BUFFER A9

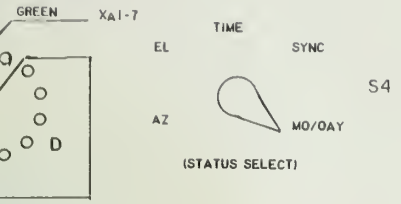
9 VOL 2 RTN
25 VOL 8 RTN
27 VOL 7 RTN
19 VOL 6 RTN
21 VOL 5 RTN
11 VOL 4 RTN
7 VOL 1 RTN
30 RANGE COVERAGE
IFAT8PM
16 DATA RDY
18 TIME SAMPLE
8 VOL 1
10 VOL 2
12 VOL 4
13 VOL 3 RTN
24
14 VOL 3
22 VOL 5
20 VOL 6
28 VOL 7
26 VOL 8
37 EL .1
47 EL .2
53 EL .4
45 EL 1
29 EL 2
31 EL 4
39 EL 8
33 EL 10
43 EL 20
49 EL 40
51 EL 80
35 EL 100
41 EL 200
68 EL INH
67 EL INH RTN
55 EL .8
46 AZ .1
48 AZ .2
38 AZ .4
40 AZ .8
32 AZ 1
50 AZ 2
30 AZ 4
52 AZ 8
36 AZ 10
42 AZ 20
44 AZ 40
34 AZ 80
56 AZ 100
54 AZ 200
66 AZ INH
65 AZ INH RTN
64 SYS TRIG
63 SYS TRIG SHLD

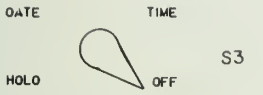
NOTES:

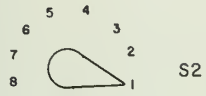
1. RISM=RANGE INTERVAL SELECT
   =RANGE COVERAGE
2. TSSM=TIME SAMPLE SELECT
3. TEST SIG MON=TEST LEVEL
4. IFAT8PM=IF AT TENUATOR.8YPASS MODE
5. A9-P2 INPUT FOR 74C RADAR
   RANGE COVERAGE:HIGH=450KM
   TEST LEVEL:HIGH=NORM,LOW=TEST
   TIME SAMPLE:HIGH=15,LOW 31
   IFAT8PM:HIGH=ON LOW=NORMAL
   DATA RDY:LOW=TRUE

WIRING DIAGRAM
WSR74 TO R541 IDE

R451-WSR74



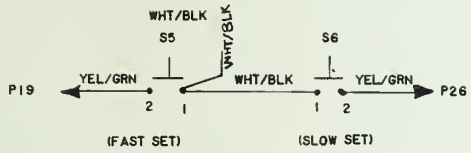


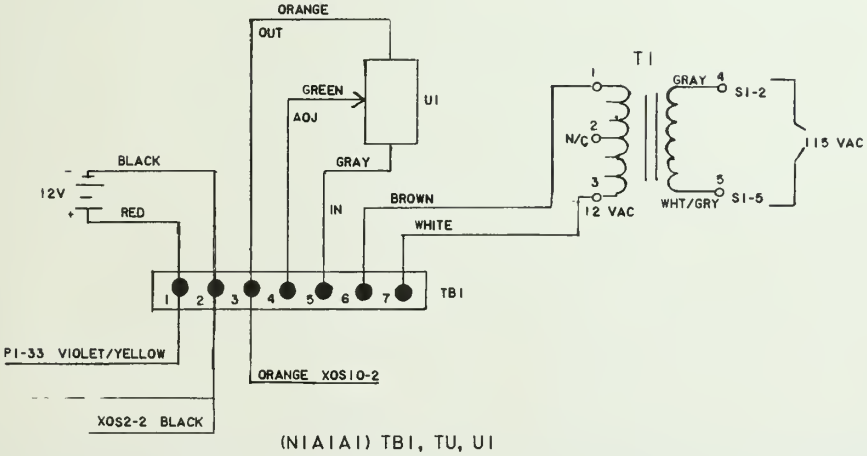


NOTES:

1. PART OF N1A1A1 (BATTERY CHARGER)
2. EVEN PINS N/C EXCEPT 72
3. PART OF BACK PLANE ASSY. (N1N2A12)
4. SWITCHES VIEWED FROM REAR
5. JUMPERS FROM PIN TO PIN ARE BARE WIRE OR CLEAR INSULATION UNLESS OTHERWISE NOTED
6. EXCEPT WHERE NOTED, ALL REFERENCES TO "P1" ON THIS PAGE ARE TO N1N2 P1
7. ALL SWITCHES AND FUNCTIONS VIEWED FROM REAR.
8. WIPER PINS ON S2 AND S4 ARE ON OPPOSITE SIDE OF WAFER.

S3-18

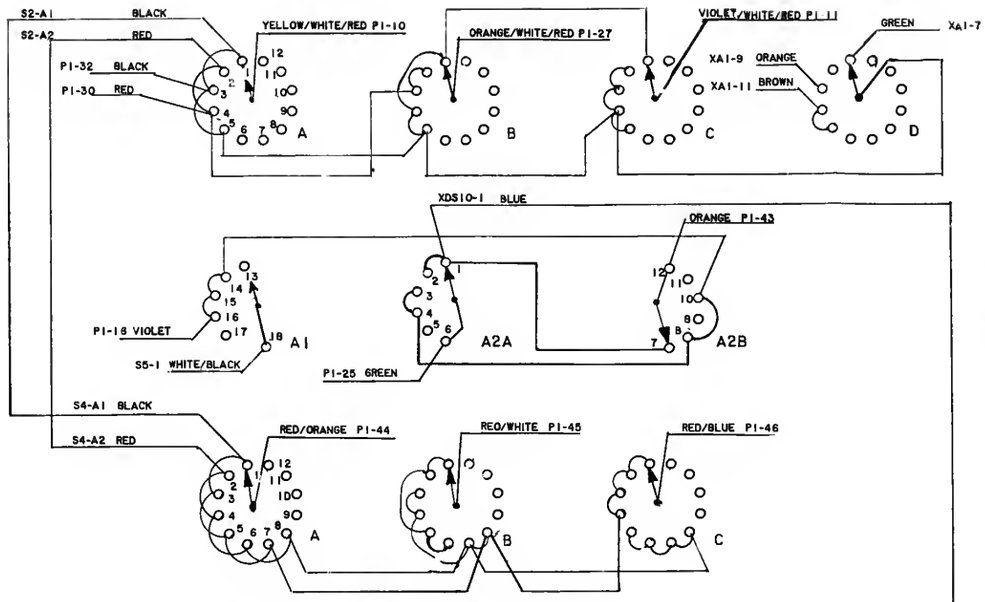




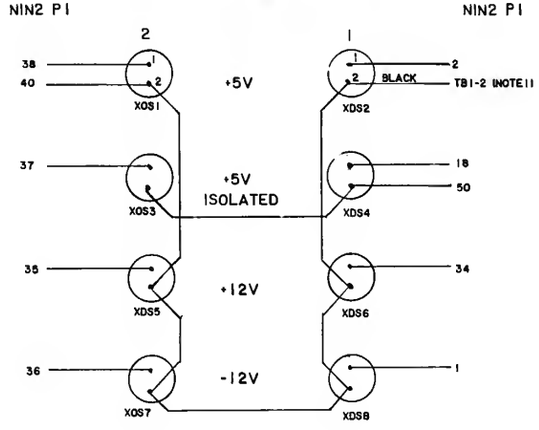
(N1A1A1) TB1, TU, U1

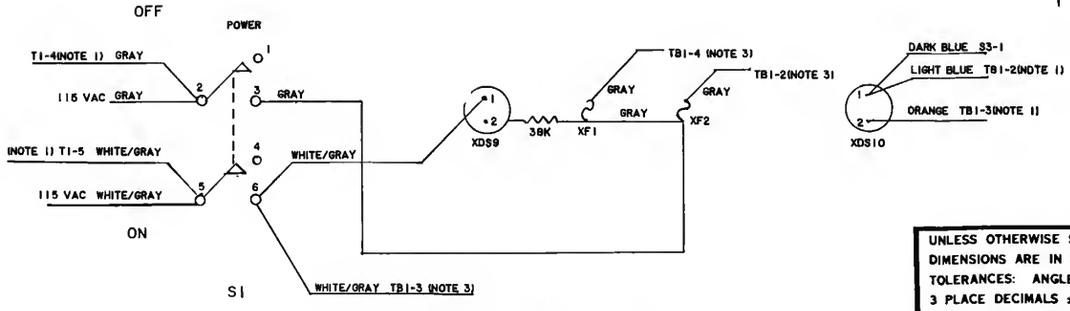
S3-1
TB1-2(NOTE 1)
-3(NOTE 1)

OTHERWISE SPECIFIED: IONS ARE IN INCHES NCES: ANGLES ± .5° E DECIMALS ± .005 E DECIMALS ± .02	ENGINEERING DIVISION SILVER SPRING, MD. 20910	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE
	PREPARED: DEDELEN CHECKED: DP DESIGN: APPROVED BY: APPROVED BY:	R540-541 FRONT PANEL N1A1
		SIZE: C DATE: DRAWING NO.: R450-N1A1-1 SCALE: SHEET: FILE:

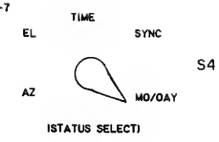


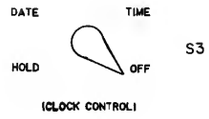
N1A1 CONTROL PANEL ROTARY SWITCHES (NOTE 5)

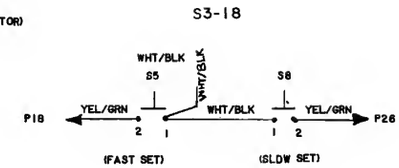




N1A1 CONTROL PANEL-REAR VIEW (PARTIAL)



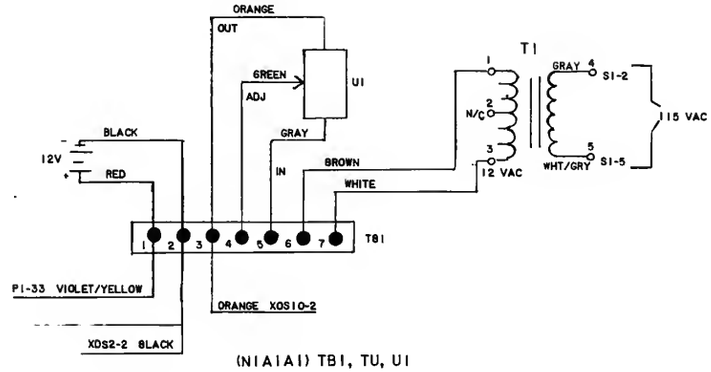




NOTES:

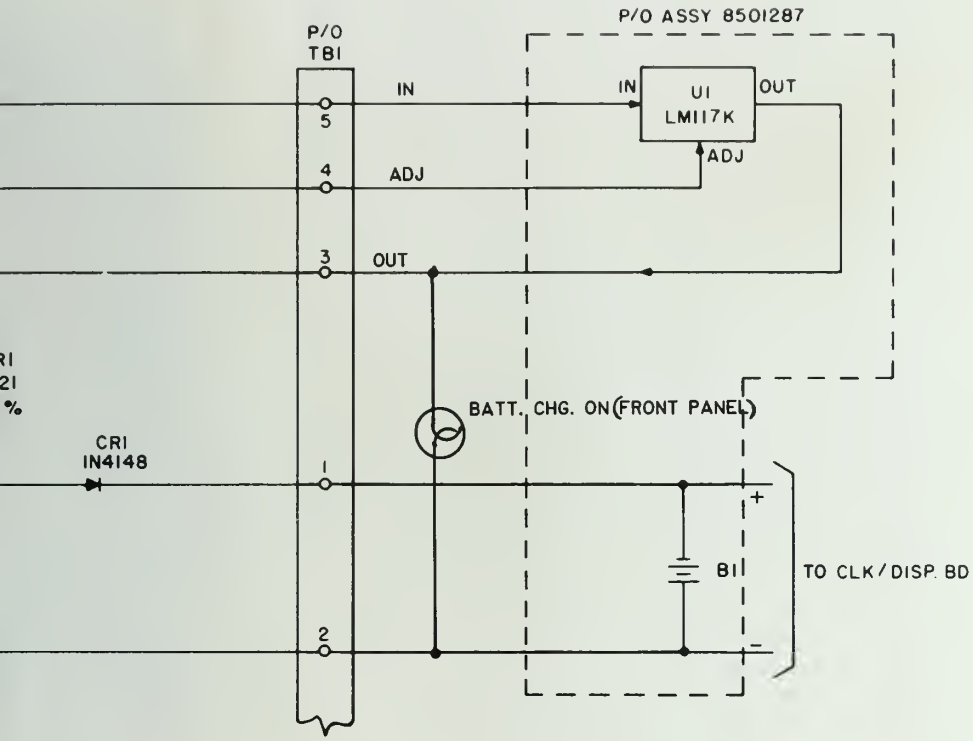
1. PART OF N1A1A1 (BATTERY CHARGER)
2. EVEN PINS N/C EXCEPT 72
3. PART OF BACK PLANE ASSY. (N1N2A12)
4. SWITCHES VIEWED FROM REAR
5. JUMPERS FROM PIN TD PIN ARE BARE WIRE OR CLEAR INSULATION UNLESS DTHERWISE NOTED
6. EXCEPT WHERE NOTED, ALL REFERENCES TO "P1" ON THIS PAGE ARE TO N1N2 P1
7. ALL SWITCHES AND FUNCTIONS VIEWED FROM REAR.

WIPER PINS ON S2 AND S4 ARE ON OPPOSITE SIDE OF WAFER.

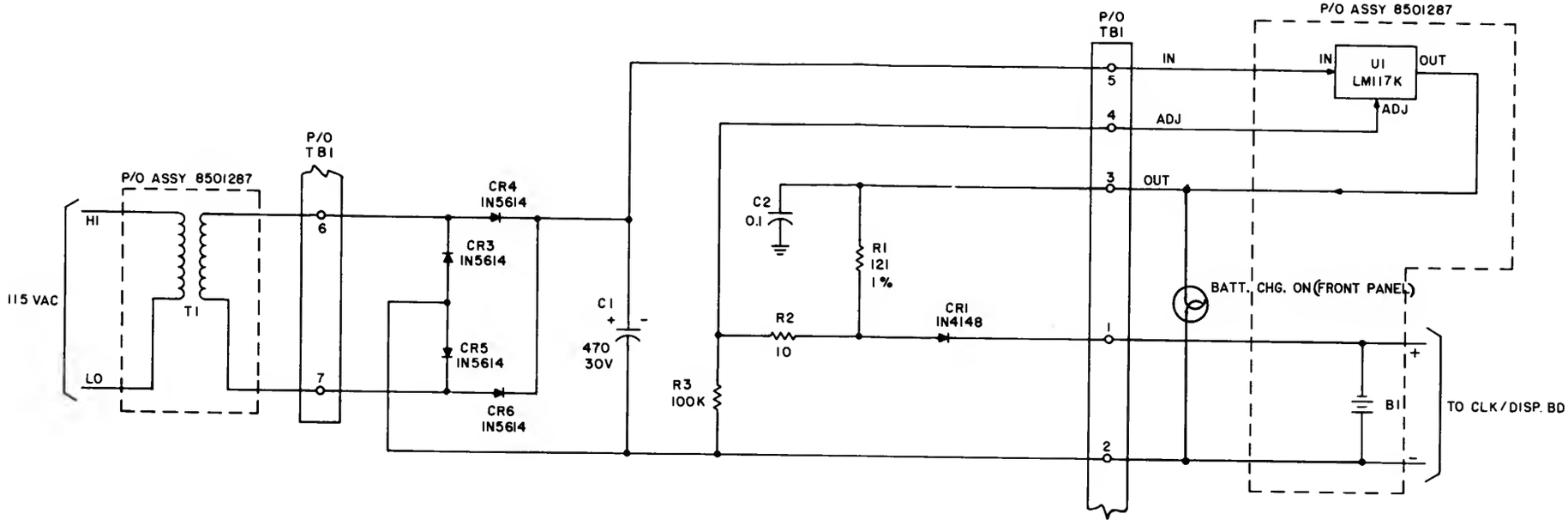


(N1A1A1) TB1, TU, U1

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: ANGLES ± .5° 3 PLACE DECIMALS ± .005 2 PLACE DECIMALS ± .02	ENGINEERING DIVISION SILVER SPRING, MD. 20910	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE
	PREPARED DEDEKIAN CHECKED DP DESIGN APPROVED BY APPROVED BY	R540-541 FRONT PANEL N1A1
		SIZE C · DATE · DRAWING NO. R450-N1A1-1 SCALE · SHEET · FILE



ESS OTHERWISE SPECIFIED: NSIONS ARE IN INCHES RANCES: ANGLES ± .5° ACE DECIMALS ± .005 ACE DECIMALS ± .02	ENGINEERING DIVISION SILVER SPRING, MD. 20910		U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE
	PREPARED D.Edelen 12/17/84		BATTERY CHARGER CCA
	CHECKED		
	DESIGN		
	APPROVED BY		SIZE C / DATE 12/17/84 / DRAWING NO. R450-CHOR-1
	APPROVED BY		SCALE / SHEET / FILE

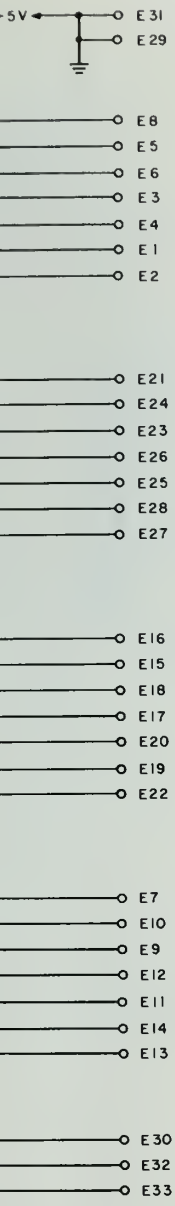


NOTE:
UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATION ARE SHOWN. FOR COMPLETE DESIGNATIONS PREFIX WITH NIAIAI.
2. RESISTANCE VALUES ARE IN OHMS.
3. RESISTORS ARE 1/4 WATT, 5% TOL.
4. CAPACITANCE VALUES ARE IN MICROFARADS.

FIGURE 10-20

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: ANGLES ± .5° 3 PLACE DECIMALS ± .005 2 PLACE DECIMALS ± .02	ENGINEERING DIVISION SILVER SPRING, MD. 20910	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE
	PREPARED D.Edelen 12/17/84	BATTERY CHARGER CCA
	CHECKED	
	DESIGN	
	APPROVED BY	SIZE C | DATE 12/17/84 | DRAWING NO. R450-CHOR-1
	APPROVED BY	SCALE | SHEET | FILE



FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ± .5°
3 PLACE DECIMALS ± .005
2 PLACE DECIMALS ± .02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED		
CHECKED		
DESIGN		

APPROVED BY

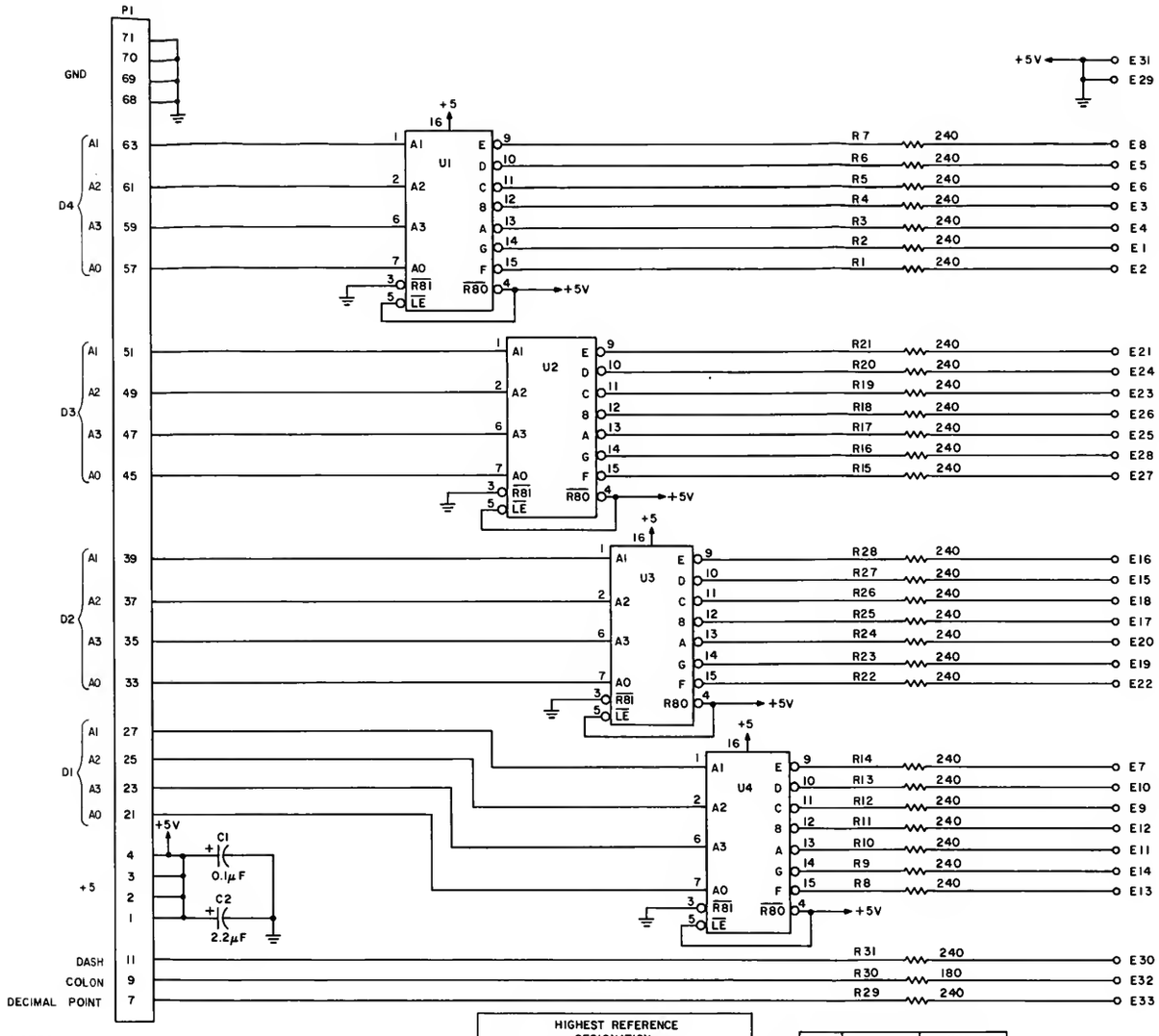
APPROVED BY

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

DISPLAY MOUNTINNG BOARD NO. 1 N1A1A3 SCHEMATIC DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A1A3-1

SCALE	SHEET	FILE



NOTES:
UNLESS OTHERWISE SPECIFIED:
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATION PREFIX WITH N1A1A3.
2. RESISTANCE VALUES ARE IN OHMS.
3. RESISTORS ARE 1/4 WATT, 5% TOL.

HIGHEST REFERENCE DESIGNATION							
R31	U4	C2					
REFERENCE DESIGNATIONS NOT USED							

REF DESIG	DEVICE	CONN	
		+5V	GND
U1,U2, U3,U4	9370	16	8

FIGURE 10-22

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	DTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ± .5°
3 PLACE DECIMALS ± .005
2 PLACE DECIMALS ± .02

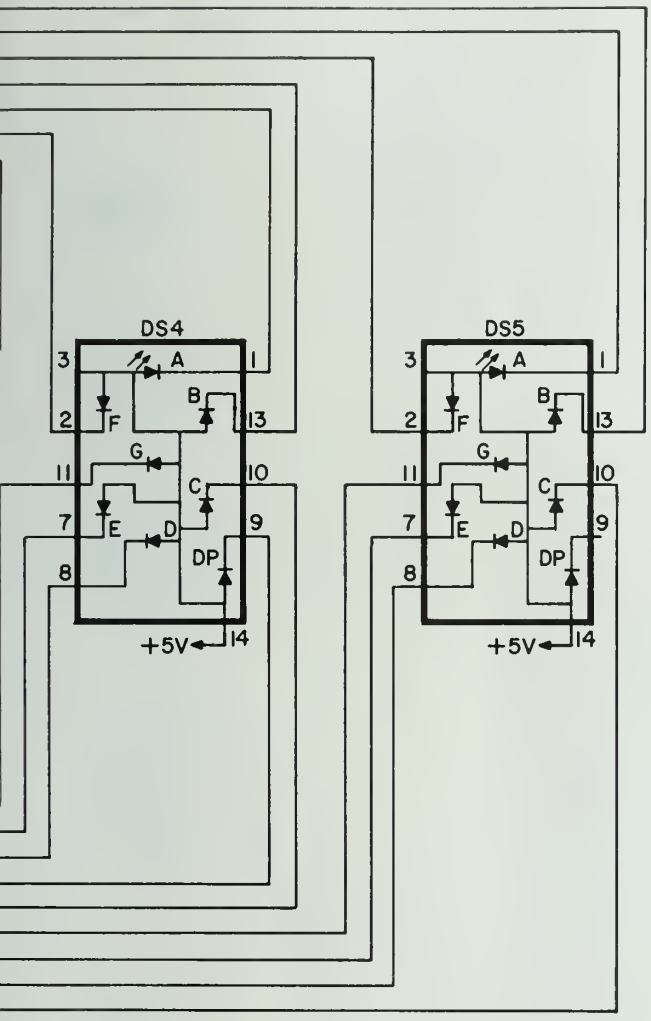
ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED		
CHECKED		
DESIGN		
APPROVED BY		
APPROVED BY		

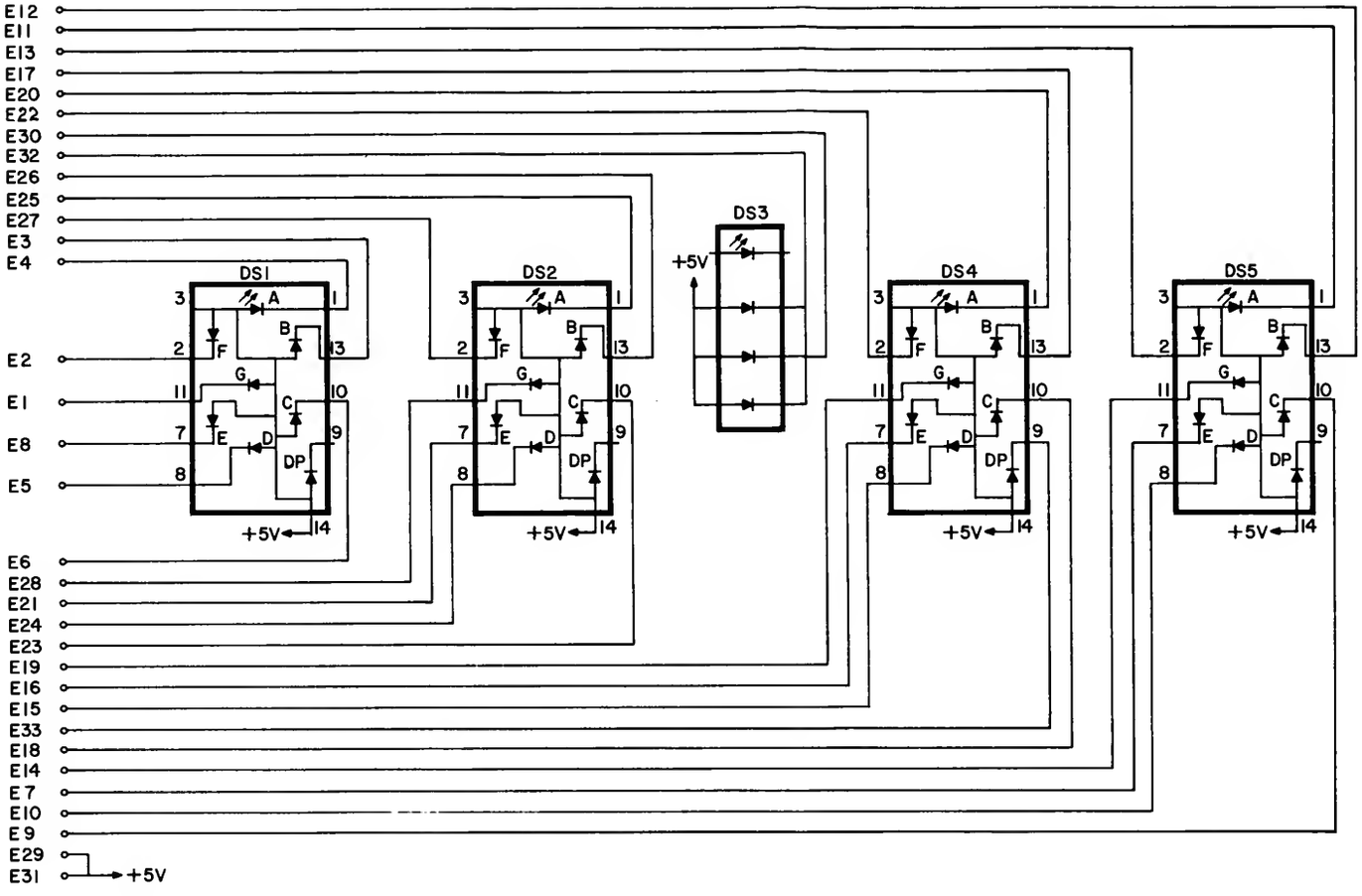
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

DISPLAY MOUNTINNG BOARD NO. 1 N1A1A3 SCHEMATIC DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A1A3-1
SCALE		SHEET / FILE



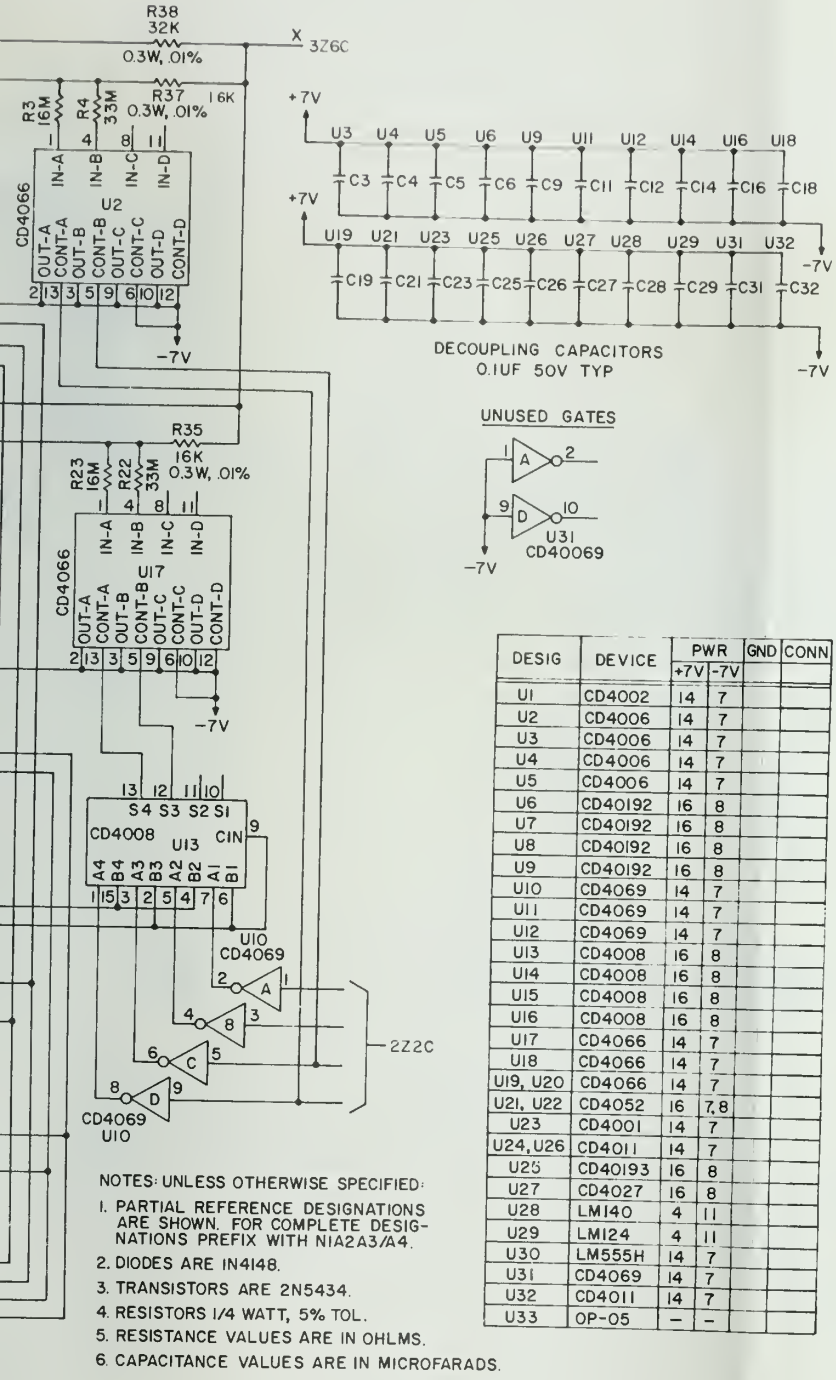
S OTHERWISE SPECIFIED: SIONS ARE IN INCHES ANCES: ANGLES ± .5° CE DECIMALS ± .005 CE DECIMALS ± .02	ENGINEERING DIVISION SILVER SPRING, MD. 20910	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE
	PREPARED CHECKED DESIGN APPROVED BY APPROVED BY	DISPLAY MOUNTING BOARD NO. 2 N1A1A2 SCHEMATIC DIAGRAM
		SIZE: C DATE: 12/17/84 DRAWING NO.: R450-A1A2-1 SCALE SHEET FILE



NOTES: UNLESS OTHERWISE SPECIFIED
1. PARTIAL REFERENCE DESIGNATIONS SHOWN. FOR COMPLETE DESIGNATIONS PREFIX WITH N1A1A2.

FIGURE 10-21

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: ANGLES ± .5° 3 PLACE DECIMALS ± .005 2 PLACE DECIMALS ± .02	ENGINEERING DIVISION SILVER SPRING, MD. 20910	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE
NOAA — NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION — U.S. DEPARTMENT OF COMMERCE	PREPARED CHECKED DESIGN APPROVED BY APPROVED BY	DISPLAY MOUNTING BOARD NO. 2 N1A1A2 SCHEMATIC DIAGRAM SIZE C · DATE 12/17/84 · DRAWING NO. R450-A1A2-1 SCALE · SHEET · FILE



DESIG	DEVICE	PWR		GND	CONN
		+7V	-7V		
U1	CD4002	14	7		
U2	CD4006	14	7		
U3	CD4006	14	7		
U4	CD4006	14	7		
U5	CD4006	14	7		
U6	CD40192	16	8		
U7	CD40192	16	8		
U8	CD40192	16	8		
U9	CD40192	16	8		
U10	CD4069	14	7		
U11	CD4069	14	7		
U12	CD4069	14	7		
U13	CD4008	16	8		
U14	CD4008	16	8		
U15	CD4008	16	8		
U16	CD4008	16	8		
U17	CD4066	14	7		
U18	CD4066	14	7		
U19, U20	CD4066	14	7		
U21, U22	CD4052	16	7,8		
U23	CD4001	14	7		
U24, U26	CD4011	14	7		
U25	CD40193	16	8		
U27	CD4027	16	8		
U28	LM140	4	11		
U29	LM124	4	11		
U30	LM555H	14	7		
U31	CD4069	14	7		
U32	CD4011	14	7		
U33	OP-05	–	–		

NOTES: UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATIONS PREFIX WITH N1A2A3/A4.
2. DIODES ARE IN4148.
3. TRANSISTORS ARE 2N5434.
4. RESISTORS 1/4 WATT, 5% TOL.
5. RESISTANCE VALUES ARE IN OHLMS.
6. CAPACITANCE VALUES ARE IN MICROFARADS.

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL
LIST OF MATERIAL							

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±.5°
3 PLACE DECIMALS ±.005
2 PLACE DECIMALS ±.02

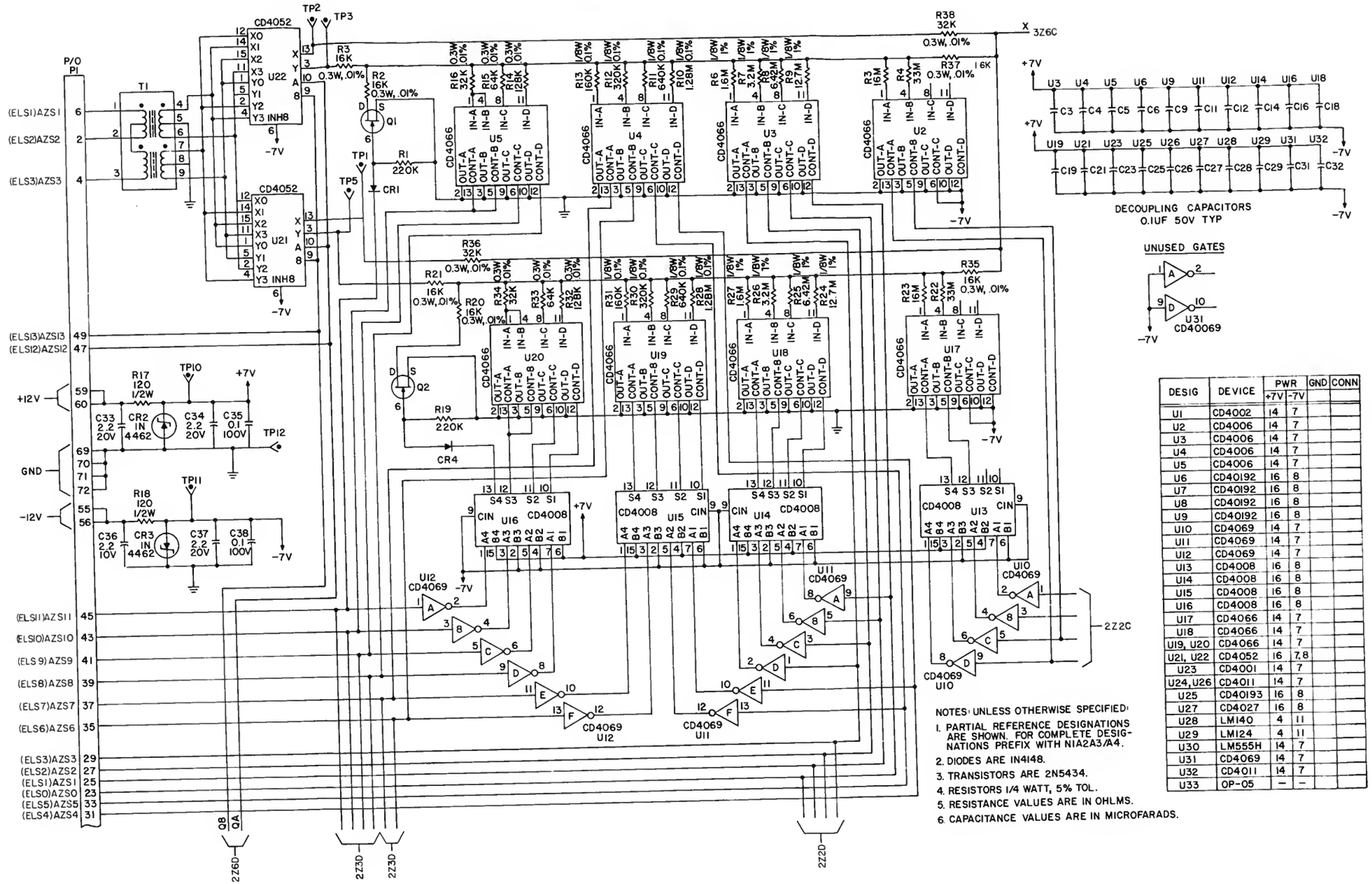
ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED	D. EDELEN	
CHECKED		
DESIGN		
APPROVED BY		
APPROVED BY		

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

SYNCHRO CONVERTER CCA N1A1A3/A4 SCHEMATIC DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A2A3/A4-1
SCALE	SHEET 1 OF 3	FILE



DESIG	DEVICE	PWR +7V	PWR -7V	GND	CONN
U1	CD4002	14	7		
U2	CD4006	14	7		
U3	CD4006	14	7		
U4	CD4006	14	7		
U5	CD4006	14	7		
U6	CD40192	16	8		
U7	CD40192	16	8		
U8	CD40192	16	8		
U9	CD40192	16	8		
U10	CD4069	14	7		
U11	CD4069	14	7		
U12	CD4069	14	7		
U13	CD4008	16	8		
U14	CD4008	16	8		
U15	CD4008	16	8		
U16	CD4008	16	8		
U17	CD4066	14	7		
U18	CD4066	14	7		
U19, U20	CD4066	14	7		
U21, U22	CD4052	16	7,8		
U23	CD4001	14	7		
U24, U26	CD4011	14	7		
U25	CD40193	16	8		
U27	CD4027	16	8		
U28	LM140	4	11		
U29	LM124	4	11		
U30	LM555H	14	7		
U31	CD4069	14	7		
U32	CD4011	14	7		
U33	OP-05	—	—		

NOTES: UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATIONS PREFIX WITH N1A2A3/A4.
2. DIODES ARE IN4148.
3. TRANSISTORS ARE 2N5434.
4. RESISTORS 1/4 WATT, 5% TOL.
5. RESISTANCE VALUES ARE IN OHLMS.
6. CAPACITANCE VALUES ARE IN MICROFARADS.

FIGURE 10-24

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±.5°
3 PLACE DECIMALS ±.005
2 PLACE DECIMALS ±.02

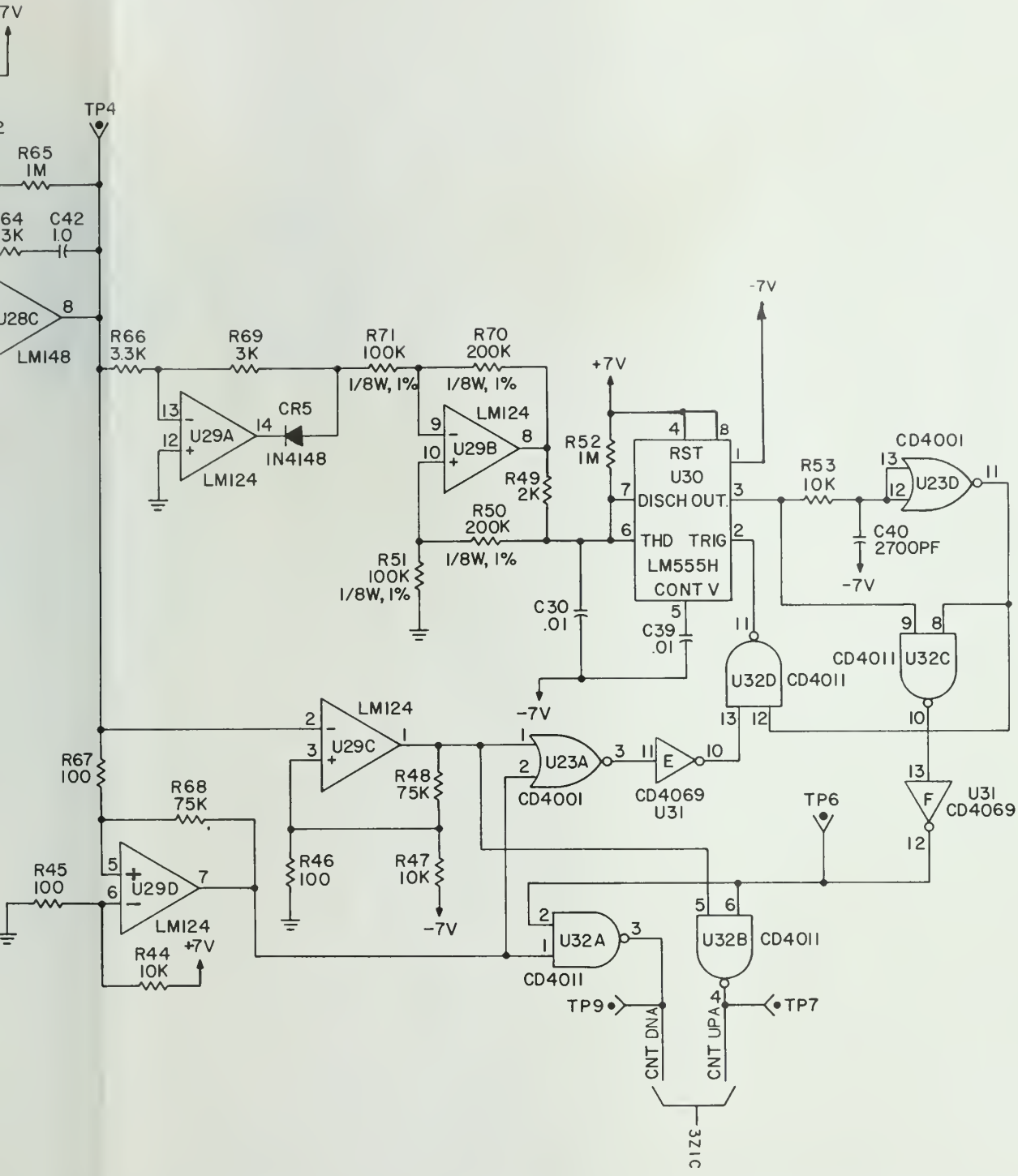
ENGINEERING DIVISION
SILVER SPRING, MD. 20910

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

SYNCHRO CONVERTER CCA
N1A1A3/A4
SCHEMATIC DIAGRAM

PREPARED	D. EDELEN	
CHECKED		
DESIGN		
APPRVED BY		
APPRVED BY		

SIZE D | DATE 12/17/84 | DRAWING NO. R450-A2A3/A4-1
SCALE | SHEET 1 OF 3 | FILE



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: ANGLES ± .5° 3 PLACE DECIMALS ± .005 2 PLACE DECIMALS ± .02	ENGINEERING DIVISION SILVER SPRING, MD. 20910	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE	
	PREPARED: D. Edelen 12/17/84 CHECKED: DESIGN: APPROVED BY: APPROVED BY:	SYNCHRO CONVERTER CCA N1A1A3/A4 SCHEMATIC DIAGRAM	
		SIZE: C	DATE: 12/17/84
		DRAWING NO.: R450-A1A3/AA-2	
		SCALE:	SHEET 2 OF 3
		FILE:	

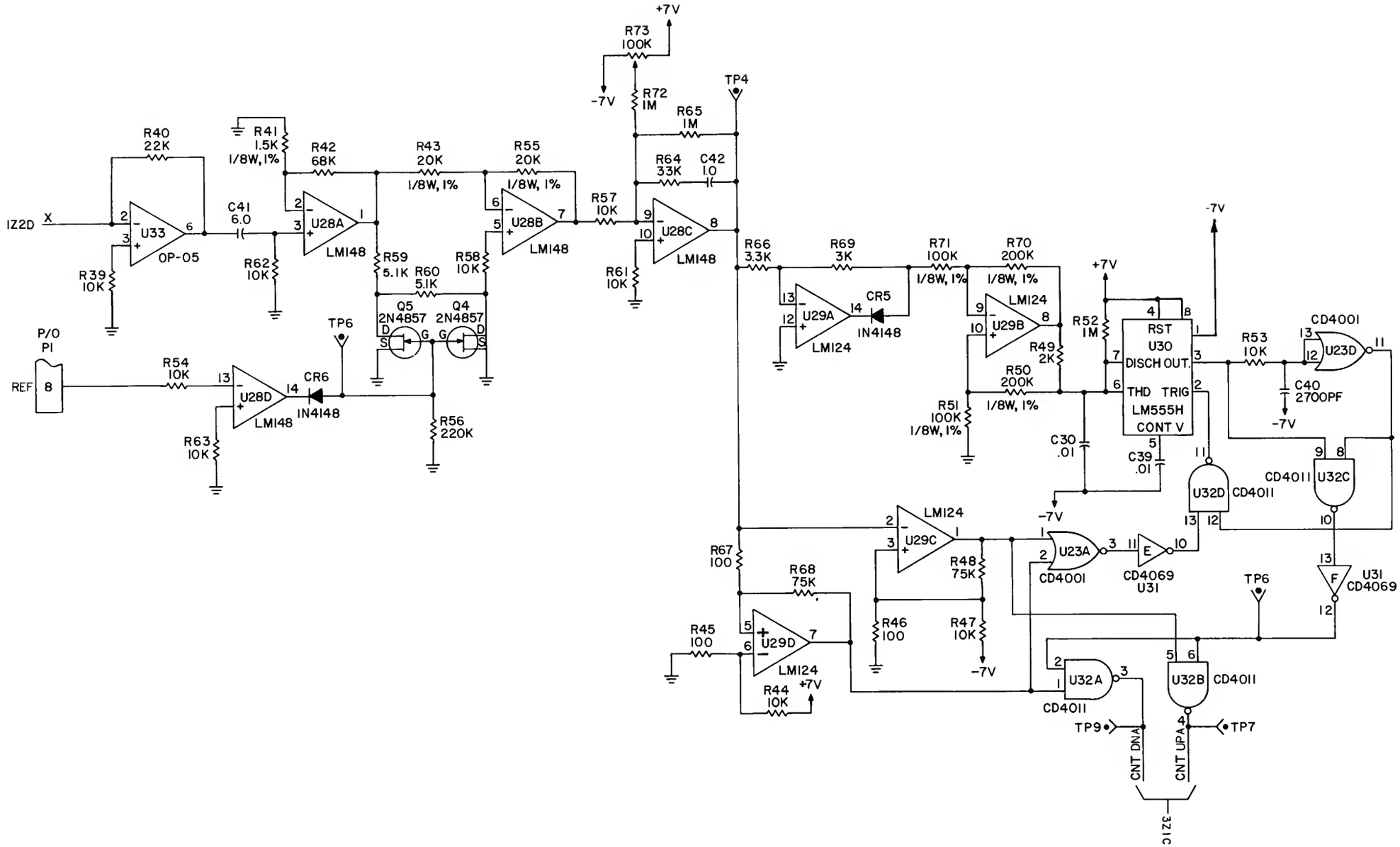
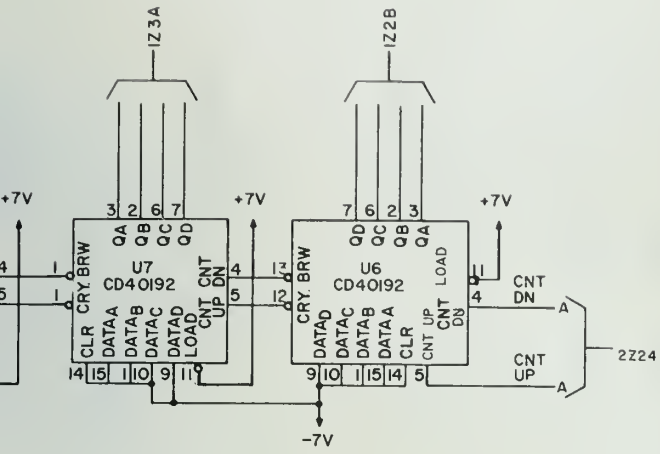


FIGURE 10-24

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: ANGLES ± .5° 3 PLACE DECIMALS ± .005 2 PLACE DECIMALS ± .02	ENGINEERING DIVISION SILVER SPRING, MD. 20910	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE
NOAA	PREPARED D. Edelen 12/17/84	SYNCHRO CONVERTER CCA N1A1A3/A4 SCHEMATIC DIAGRAM
	CHECKED	
	DESIGN	
	APPROVED BY	
	APPROVED BY	
	SIZE C	DATE 12/17/84
	DRAWING NO. R450-A1A3/AA-2	
	SCALE	SHEET 2 OF 3 FILE



FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ± .5°
3 PLACE DECIMALS ± .005
2 PLACE DECIMALS ± .02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED	D. Edelen	12/17/84
CHECKED		
DESIGN		

APPROVED BY

APPROVED BY

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

SYNCHRO CONNVERTER CCA
N1A1A3/A4
SCHEMATIC DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A2A3/A4-3
SCALE		SHEET 3 OF 3

FILE

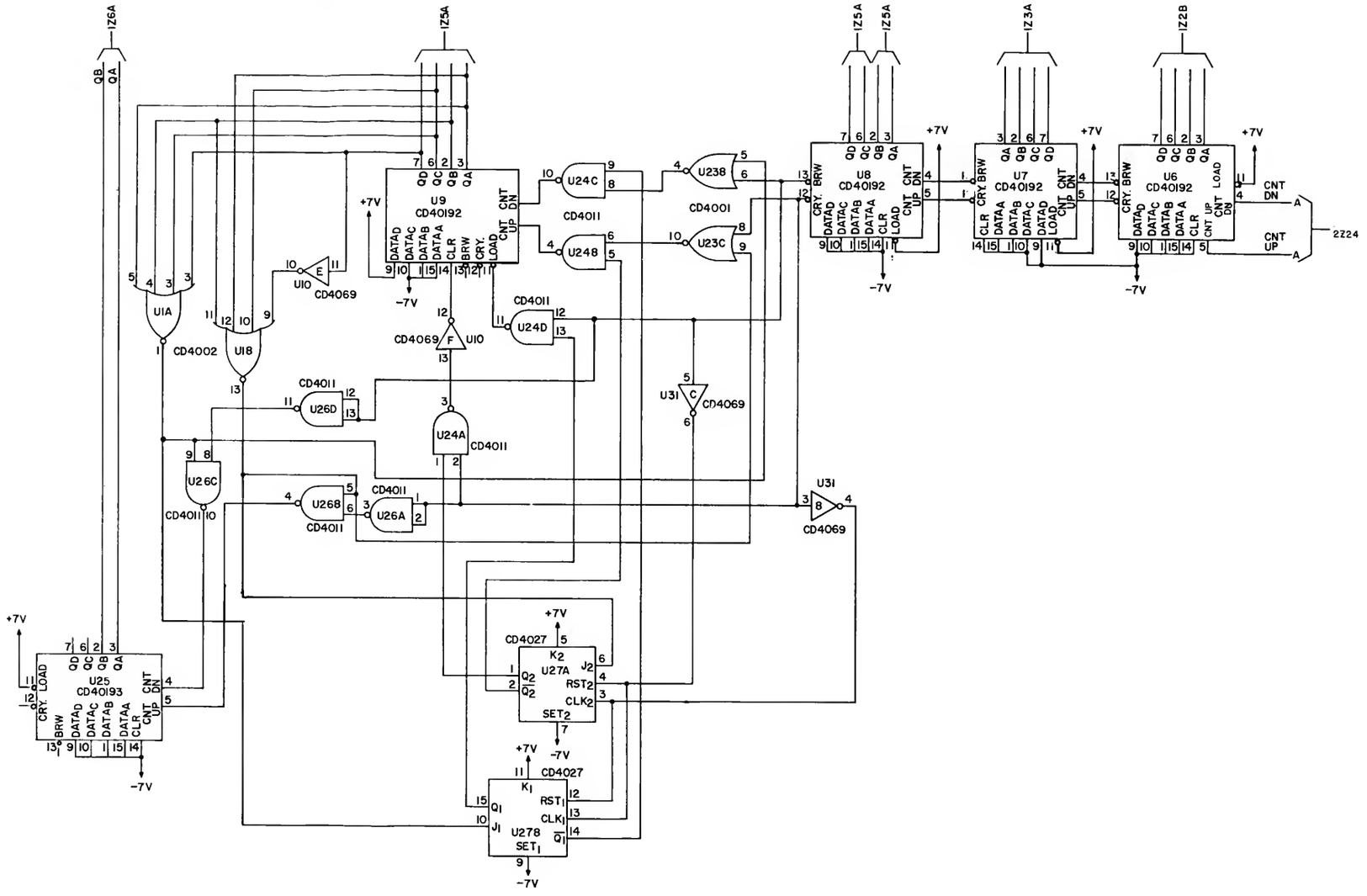


FIGURE 10-24

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±.5°
3 PLACE DECIMALS ±.005
2 PLACE DECIMALS ±.02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

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APPROVED BY		

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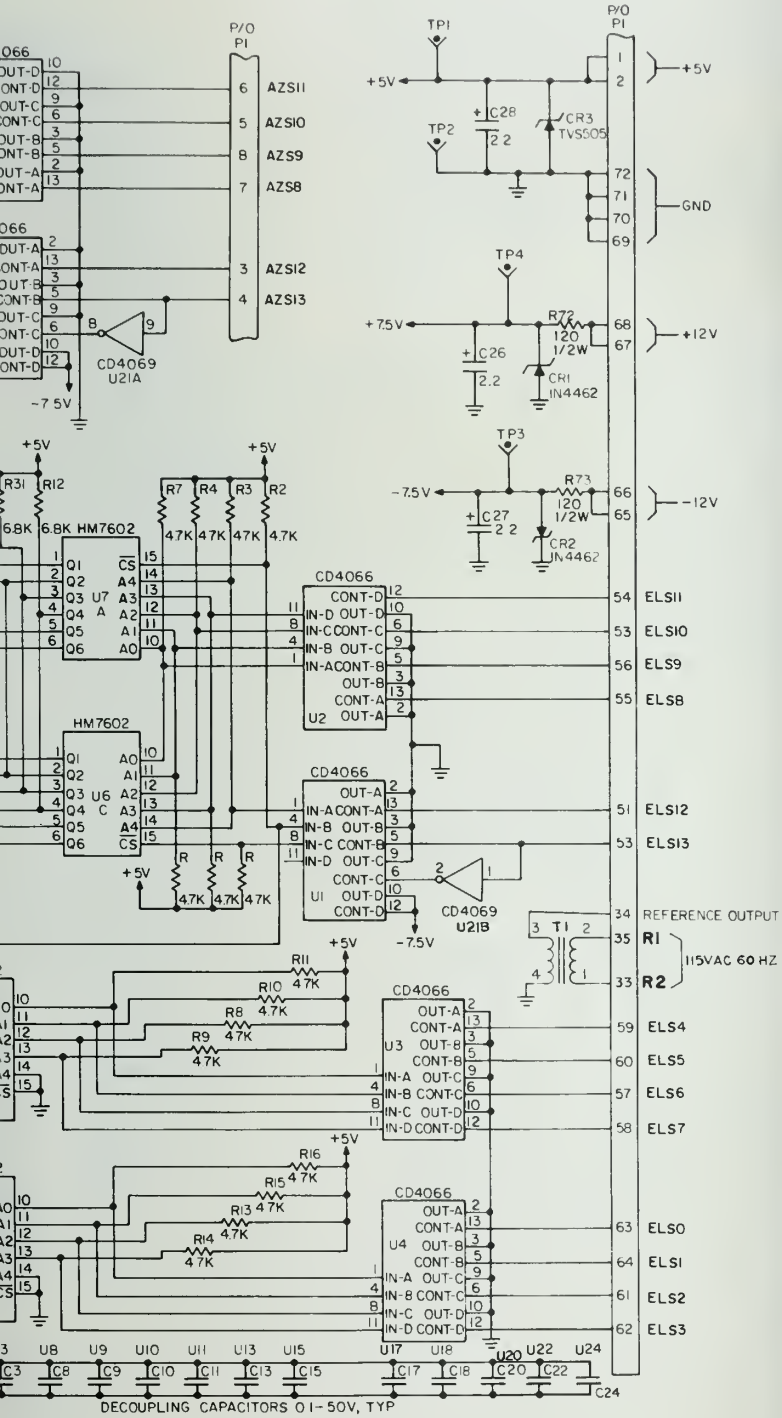
NATIONAL WEATHER SERVICE

SYNCHRO CONNVERTER CCA N1A1A3/A4 SCHEMATIC DIAGRAM.

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A2A3/A4-3
SCALE		SHEET 3 OF 3
		FILE



FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ± .5°
3 PLACE DECIMALS ± .005
2 PLACE DECIMALS ± .02

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SILVER SPRING, MD. 20910

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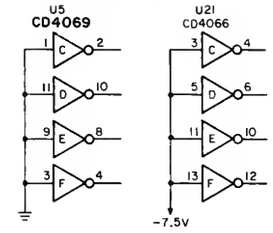
NATIONAL WEATHER SERVICE

SYNCHRO OUTPUT CCA
N1A2A5
SCHEMATIC DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A2A5-1
SCALE		SHEET / FILE

UNUSED GATES:



REF DESIG	DEVICE	PWR & GND CONNECTION			
		+5V	+7.5V	-7.5V	GND
U1	C04066		14	7	
U2	C04066		14	7	
U3	C04066		14	7	
U4	C04066		14	7	
U5	C04069	14			7
U6	HM7602	16			8
U7	HM7602	16			8
U8	HM7602	16			8
U9	HM7602	16			8
U10	HM7602	16			8
U11	14560	16			8
U12	14560	16			8
U13	14560	16			8
U14	14560	16			8
U15	54LS240	20			10
U16	54LS240	20			10
U17	54S373	20			10
U18	HM7602	16			8
U19	HM7602	16			8
U20	54S373	20			10
U21	C04069		14	7	
U22	C04066		14	7	
U23	C04066		14	7	
U24	C04066		14	7	
U25	C04066		14	7	

HIGHEST REFERENCE DESIGNATION							
U25	TP4	C28	R73	T1	C3		
REFERENCE DESIGNATIONS NOT USED							
C2	C4	C7	C12	C14	C16	C19	C21
C25							

NOTES:

UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATION PREFIX WITH N1A2A5.
2. RESISTANCE VALUES ARE IN OHMS.
3. RESISTORS ARE 1/4 WATT, 5% TOL.
4. CAPACITANCE VALUES ARE IN MICROFARADS.

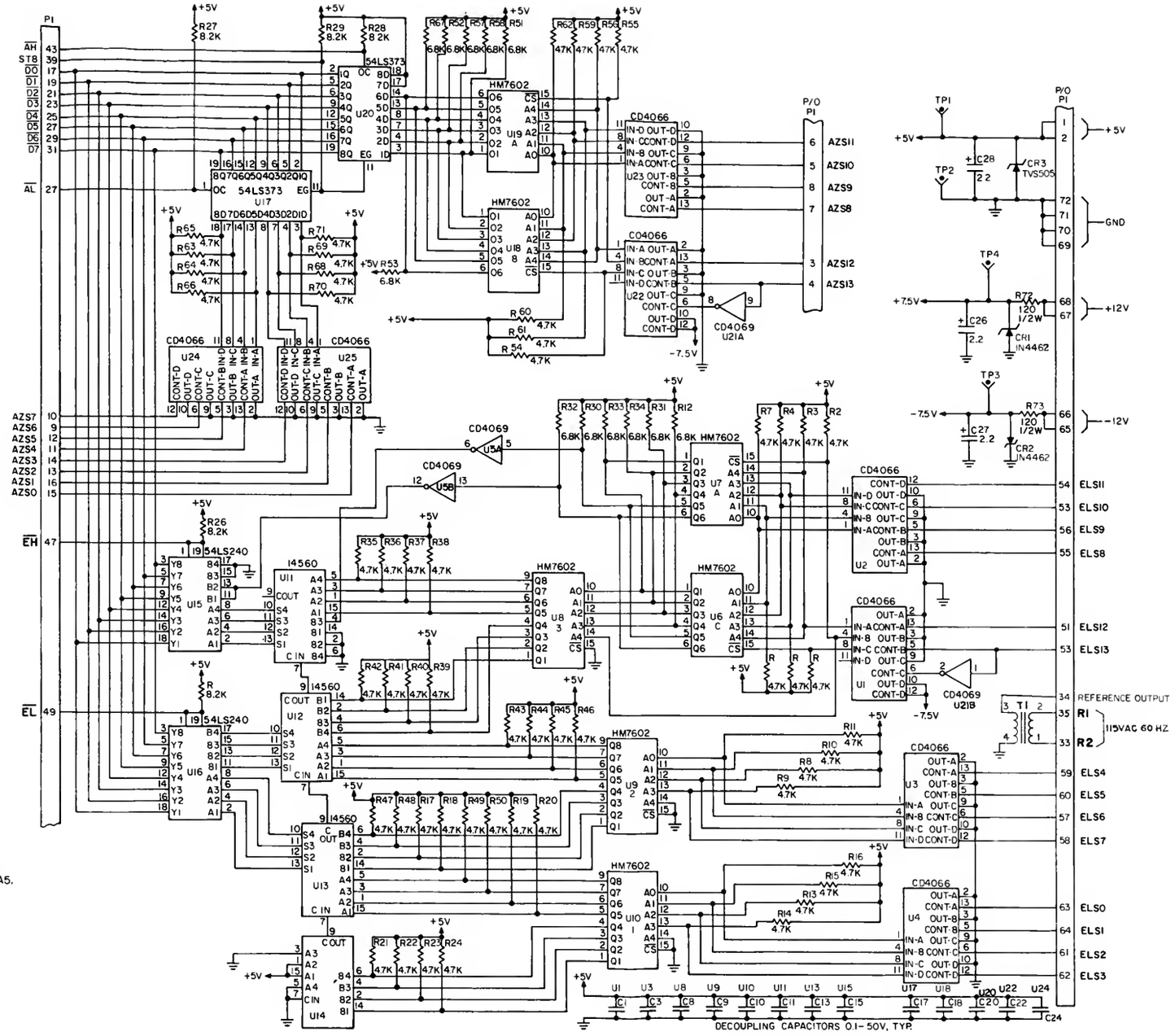


FIGURE 10-25

FINO NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	OWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±.5°
3 PLACE DECIMALS ±.005
2 PLACE DECIMALS ±.02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

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APPROVED BY		
APPROVED BY		

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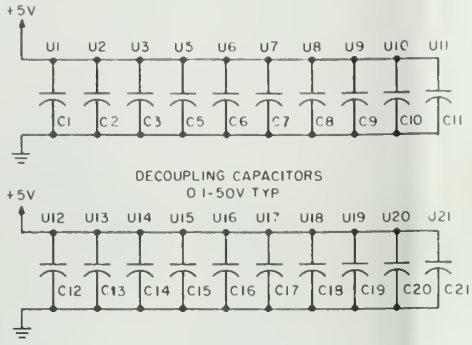
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

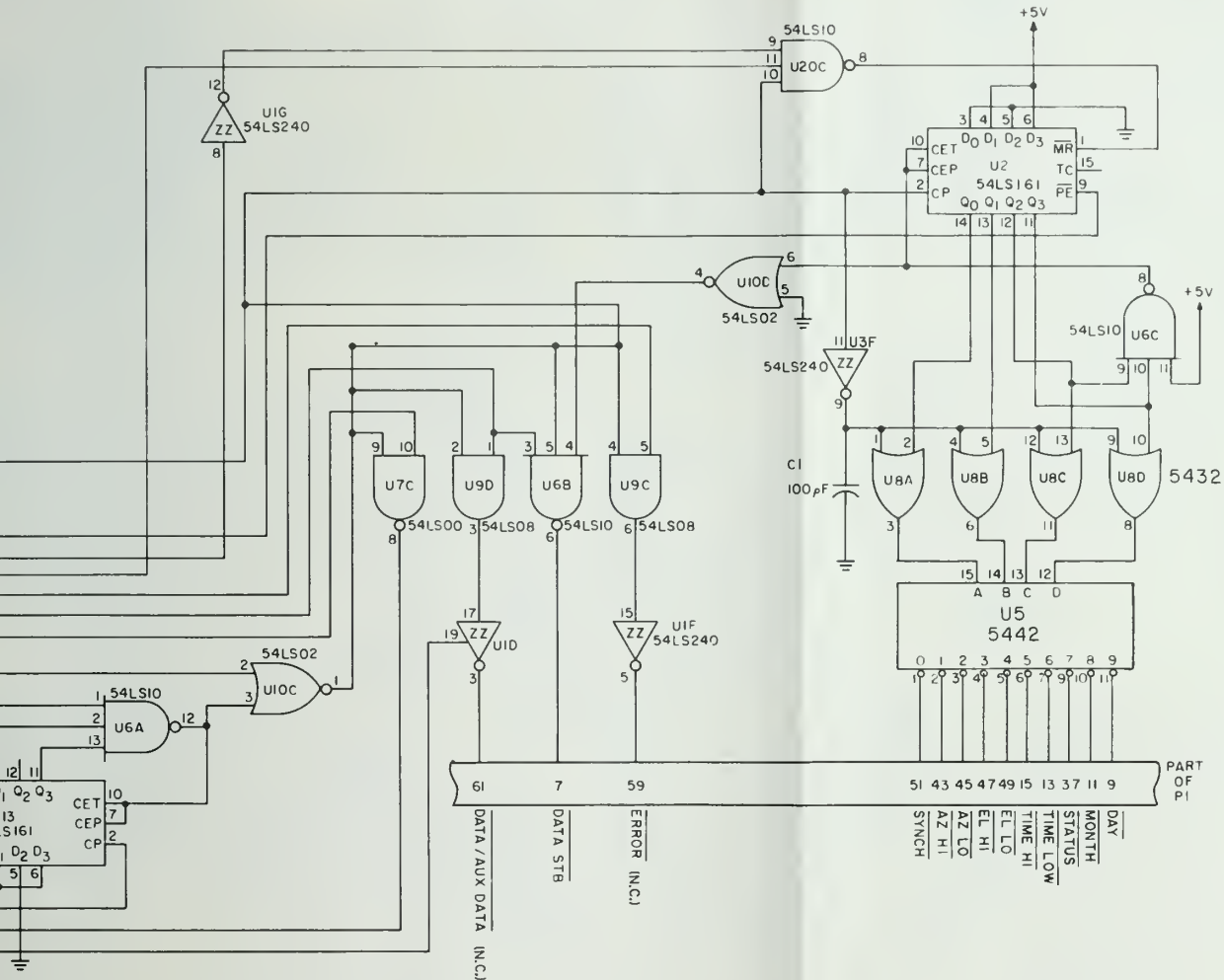
SYNCHRO OUTPUT CCA
N1A2A5
SCHEMATIC DIAGRAM

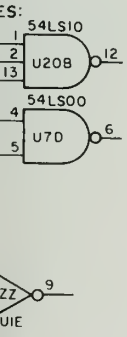
SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A2A5-1
SCALE		SHEET / FILE

'ECIFIED
IATIONS ARE SHOWN.
NS PREFIX WITH

% TOL.
OHMS.
MICROFARADS.







FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±.5°
3 PLACE DECIMALS ±.005
2 PLACE DECIMALS ±.02

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SILVER SPRING, MD. 20910

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NATIONAL WEATHER SERVICE

DE RECEIVER CCA N1A2A6 SCHEMATIC DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A2A6-1
SCALE		SHEET / FILE

NOTES: UNLESS OTHERWISE SPECIFIED
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATIONS PREFIX WITH N1A2A6.
2. DIODES ARE TVS505.
3. RESISTORS ARE 1/4 WATT, 5% TOL.
4. RESISTANCE VALUES ARE IN OHMS.
5. CAPACITANCE VALUES ARE IN MICROFARADS.

DECOUPLING CAPACITORS
0.1-50V TYP

UNUSED GATES:

HIGHEST REFERENCE DESIGNATION							
U21	C24	CR1	R3	TP5			
REFERENCE DESIGNATIONS NOT USED							
C4							

FIGURE 10-26

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±.5°
3 PLACE DECIMALS ±.005
2 PLACE DECIMALS ±.02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

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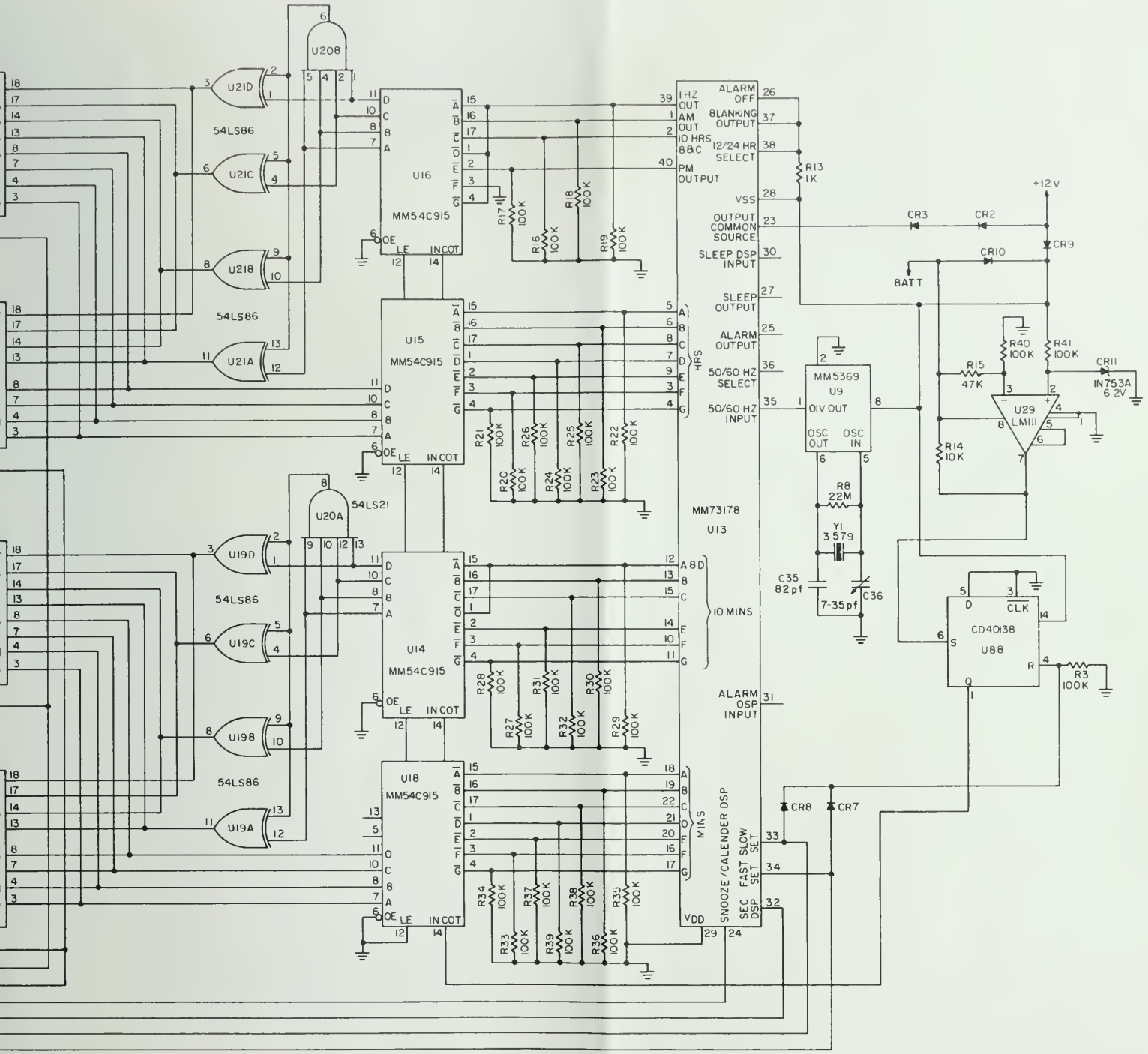
NATIONAL WEATHER SERVICE

DE RECEIVER CCA N1A2A6 SCHEMATIC DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A2A6-1
SCALE		SHEET / FILE



FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ± .5°
3 PLACE DECIMALS ± .005
2 PLACE DECIMALS ± .02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

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NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

CLOCK/DISPLAY CCA.
N1A2A7
SCHEMATIC DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A2A7-1
SCALE		SHEET 1 OF 2 FILE

NOTES:
UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATIONS PREFIX WITH N1A2A7.
2. RESISTANCE VALUES ARE IN OHMS.
3. RESISTORS ARE 1/4 WATT, 5% TOL.
4. CAPACITANCE VALUES ARE IN MICROFARADS.
5. ALL DIODES IN4148 CR2 THROUGH CR10.

HIGHEST REFERENCE DESIGNATION					
U29	C46	CR11	Y1	R54	TP4
Q1					
REFERENCE DESIGNATIONS NOT USED					
C5	C9	C12	C13	C17	C34

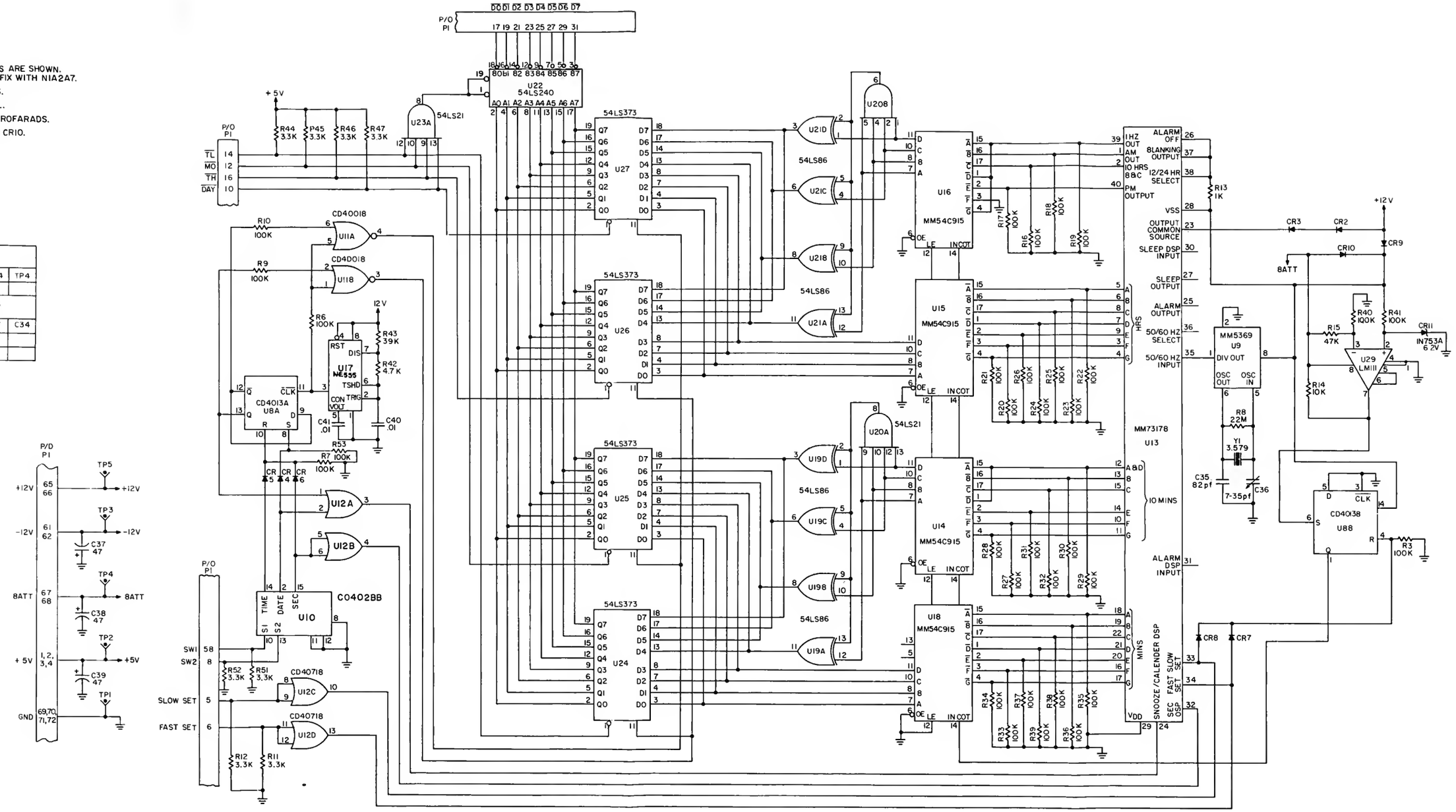

FIGURE 10-27

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±.5°
3 PLACE DECIMALS ±.005
2 PLACE DECIMALS ±.02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

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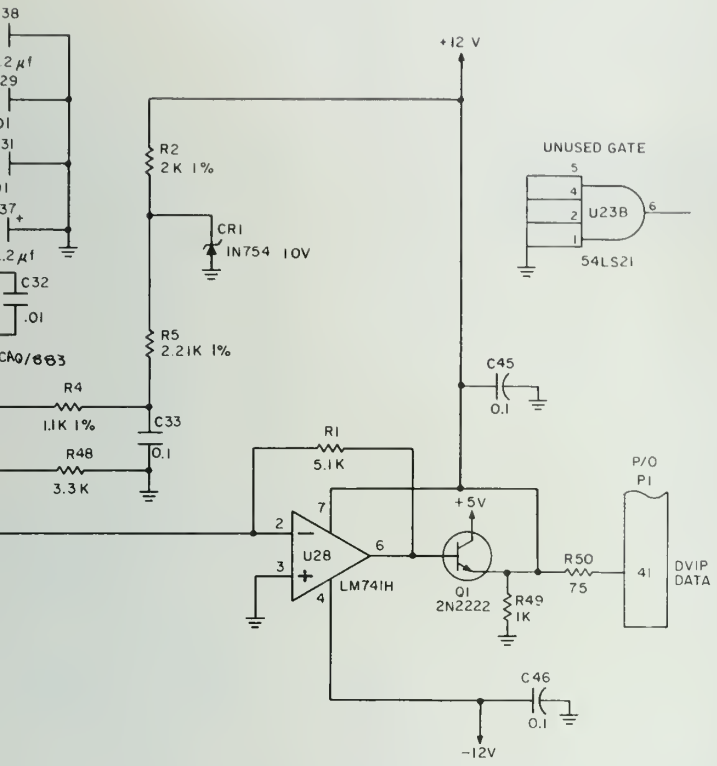
NATIONAL WEATHER SERVICE

CLOCK/DISPLAY CCA. N1A2A7 SCHEMATIC DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A2A7-1
SCALE		SHEET 1 OF 2 FILE



REF DESIG	DEVICE	PWR & GND CONNECTION			
		+5V	GND	+12V	-12V
U1	54LS373	20	10		
U2	54LS373	20	10		
U3	54LS174	16	8		
U4	54LS174	16	8		
U5	DAC-08A		1,2	13	3
U6	54LS251	16	8		
U7	54LS251	16	8		
U8	CD4013B	14	7		
U9	MM5369	8	2		
U10	CD40288	16	8		
U11	CD4001B	14	7		
U12	CD4071B	16	8		
U13	MM73178N	29	30		
U14	MM54C915	18	9		
U15	MM54C915	18	9		
U16	MM54C915	18	9		
U17	LM555	8	2		
U18	MM54C915	18	9		
U19	54LS86	14	7		
U20	54LS21	14	7		
U21	54LS86	14	7		
U22	54LS240	20	10		
U23	54LS21	14	7		
U24	54LS373	20	10		
U25	54LS373	20	10		
U26	54LS373	20	10		
U27	54LS373	20	10		

DIGIT 1

DIGIT 2

DIGIT 3

DIGIT 4

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±.5°
3 PLACE DECIMALS ±.005
2 PLACE DECIMALS ±.02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

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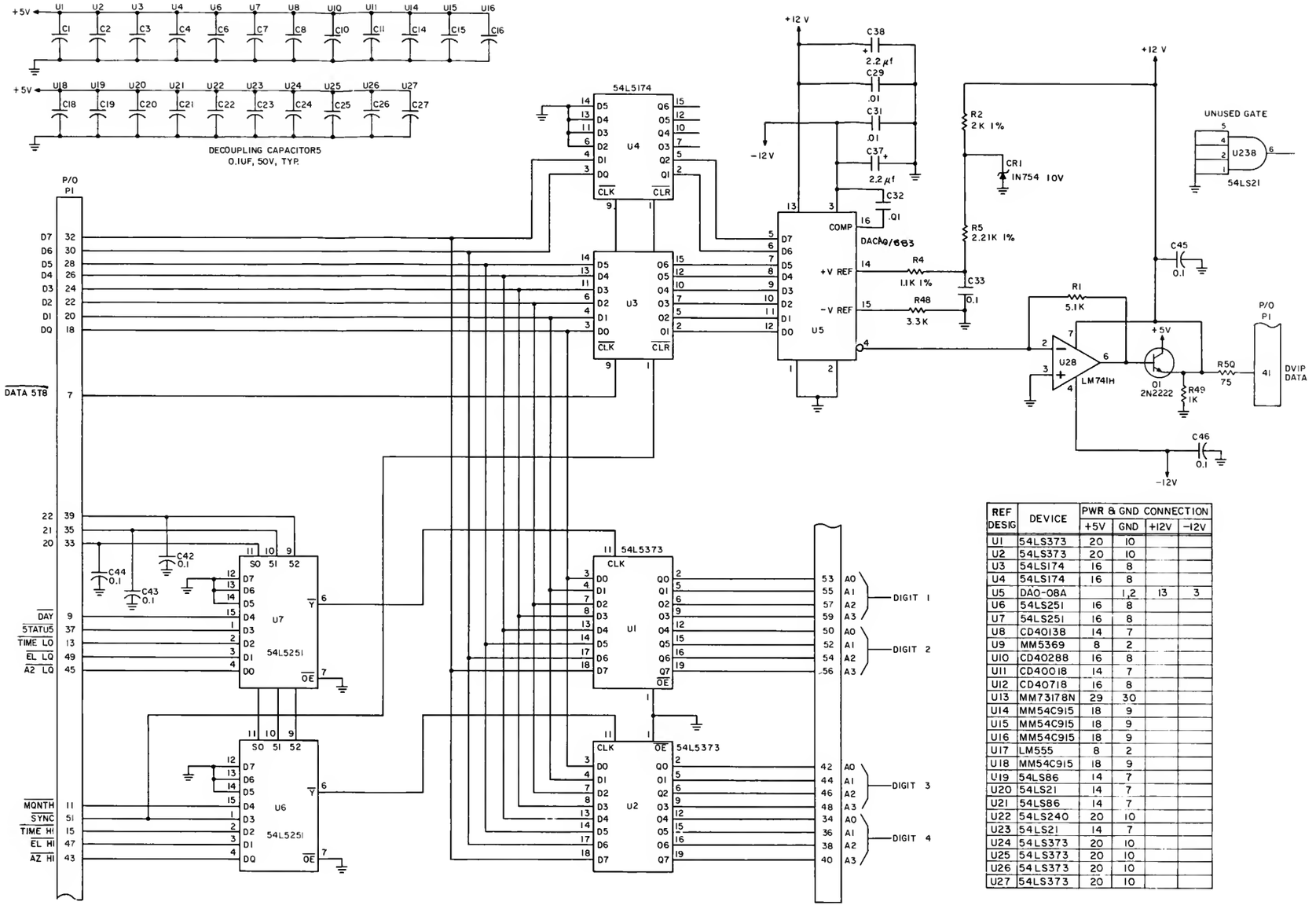
CLOCK/DISPLAY CCA N1A2A7

SCHEMATIC DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A2A7-2
SCALE		SHEET 2 OF 2 FILE



REF DESIG	DEVICE	PWR & GND CONNECTION			
		+5V	GND	+12V	-12V
U1	54LS373	20	10		
U2	54LS373	20	10		
U3	54LS174	16	8		
U4	54LS174	16	8		
U5	DAO-08A		1,2	13	3
U6	54LS251	16	8		
U7	54LS251	16	8		
U8	CD40138	14	7		
U9	MM5369	8	2		
U10	CD40288	16	8		
U11	CD40018	14	7		
U12	CD40718	16	8		
U13	MM73178N	29	30		
U14	MM54C915	18	9		
U15	MM54C915	18	9		
U16	MM54C915	18	9		
U17	LM555	8	2		
U18	MM54C915	18	9		
U19	54LS86	14	7		
U20	54LS21	14	7		
U21	54LS86	14	7		
U22	54LS240	20	10		
U23	54LS21	14	7		
U24	54LS373	20	10		
U25	54LS373	20	10		
U26	54LS373	20	10		
U27	54LS373	20	10		

FIGURE 10-27

FINO NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±.5°
3 PLACE DECIMALS ±.005
2 PLACE DECIMALS ±.02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

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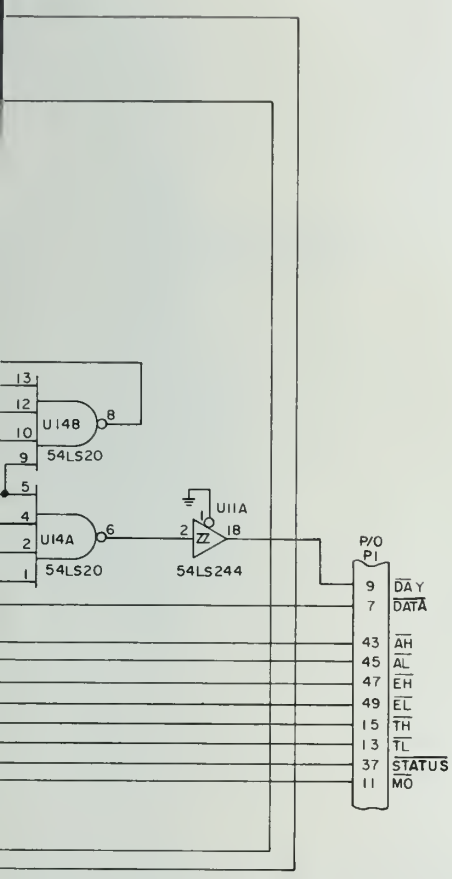
DESIGN		
APPROVED BY		
APPROVED BY		

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

CLOCK/DISPLAY CCA N1A2A7
SCHEMATIC DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A2A7-2
SCALE		SHEET 2 OF 2 FILE

NOTES UNLESS OTHERWISE SPECIFIED
1- PARTIAL REFERENCE DESIGNATIONS ARE SHOWN FOR COMPLETE DESIGNATIONS PREFIX WITH
2- RESISTANCE VALUES ARE IN OHMS.
3- RESISTORS ARE 1/4 WATT, 5% TOLERANCE.
4- CAPACITANCE VALUES ARE IN MICROFARADS.



DESIG.	DEVICE	PWR & GND CONN +5V	+12V	-12V	GND
U1	MHQ6001	18,7			8,8,14
U2	↕	↕			↕
U3	↕	↕			↕
U4	MHQ6001	18,7			8,8,14
U5	54LS240	14			7
U6	54LS165	16			8
U7	54LS165	16			8
U8	HI-1818A-2	2	14	15	
U9	µA760	8			5
U10	54LS240	20			10
U11	54LS244	20			10
U12	54LS240	20			10
U13	54LS161	16			8
U14	54LS20	14			7
U15	54LS161	16			8
U16	5445	16			8
U17	54LS10	14			7
U18	54LS132	14			7
U19	54LS04	14			7
U20	54123	16			8
U21	54LS74	14			7
U22	54LS161	16			8
U23	54S04	14			7

HIGHEST REFERENCE DESIGNATION					
C33	CR4	Q2	R42	TP11	U23
P1					Y1
REFERENCE DESIGNATIONS NOT USED					
C9					

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL
LIST OF MATERIAL							

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ± .5°
3 PLACE DECIMALS ± .005
2 PLACE DECIMALS ± .02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

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DESIGN		
APPROVED BY		
APPROVED BY		

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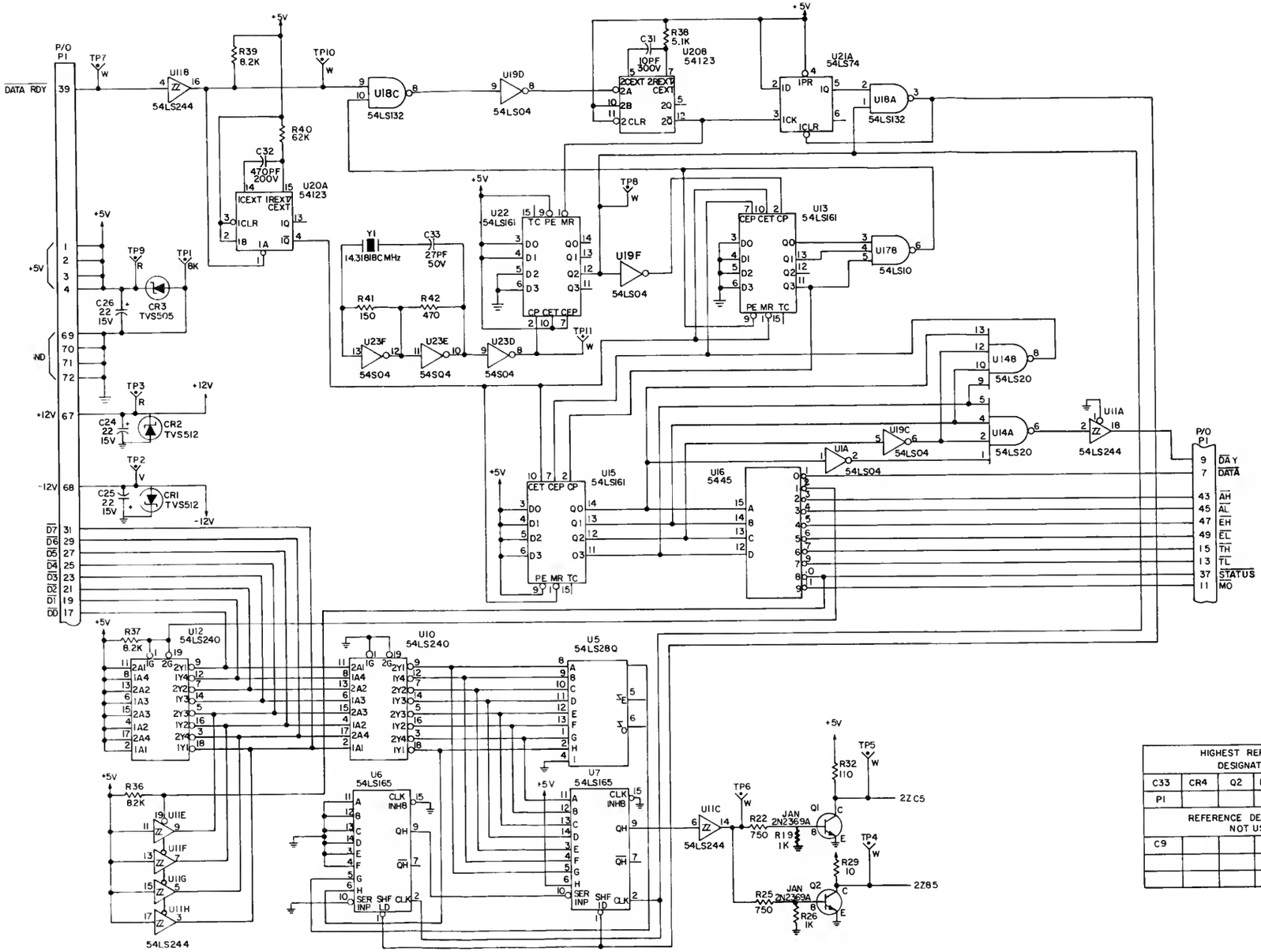
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

DE TRANSMITTER CCA N1A2A8
SCHEMATIC DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A2A8-1
SCALE		SHEET 1 OF 2 FILE



NOTES: UNLESS OTHERWISE SPECIFIED
1- PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATIONS PREFIX WITH
2- RESISTANCE VALUES ARE IN OHMS.
3- RESISTORS ARE 1/4 WATT, 5% TOLERANCE.
4- CAPACITANCE VALUES ARE IN MICROFARADS.

DESIG.	DEVICE	PWR & GND CONN +5V	+12V	-12V	GND
U1	MHQ6001	18	7		8,14
U2	↑	↑	↑		↑
U3	↓	↓	↓		↓
U4	MHQ6001	18	7		8,14
U5	54LS240	14			7
U6	54LS165	16			8
U7	54LS165	16			8
U8	HI-1818A-2	2	14	15	
U9	µA760	8			5
U10	54LS240	20			10
U11	54LS244	20			10
U12	54LS240	20			10
U13	54LS161	16			8
U14	54LS20	14			7
U15	54LS161	16			8
U16	5445	16			8
U17	54LS10	14			7
U18	54LS132	14			7
U19	54LS04	14			7
U20	54123	16			8
U21	54LS74	14			7
U22	54LS161	16			8
U23	54S04	14			7

HIGHEST REFERENCE DESIGNATION					
C33	CR4	Q2	R42	TP11	U23
P1					Y1
REFERENCE DESIGNATIONS NOT USED					
C9					

FIGURE 10-28

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±.5°
3 PLACE DECIMALS ±.005
2 PLACE DECIMALS ±.02

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NATIONAL WEATHER SERVICE

DE TRANSMITTER CCA N1A2A8
SCHEMATIC DIAGRAM

PREPARED	D. PEDERSEN	12/17/84
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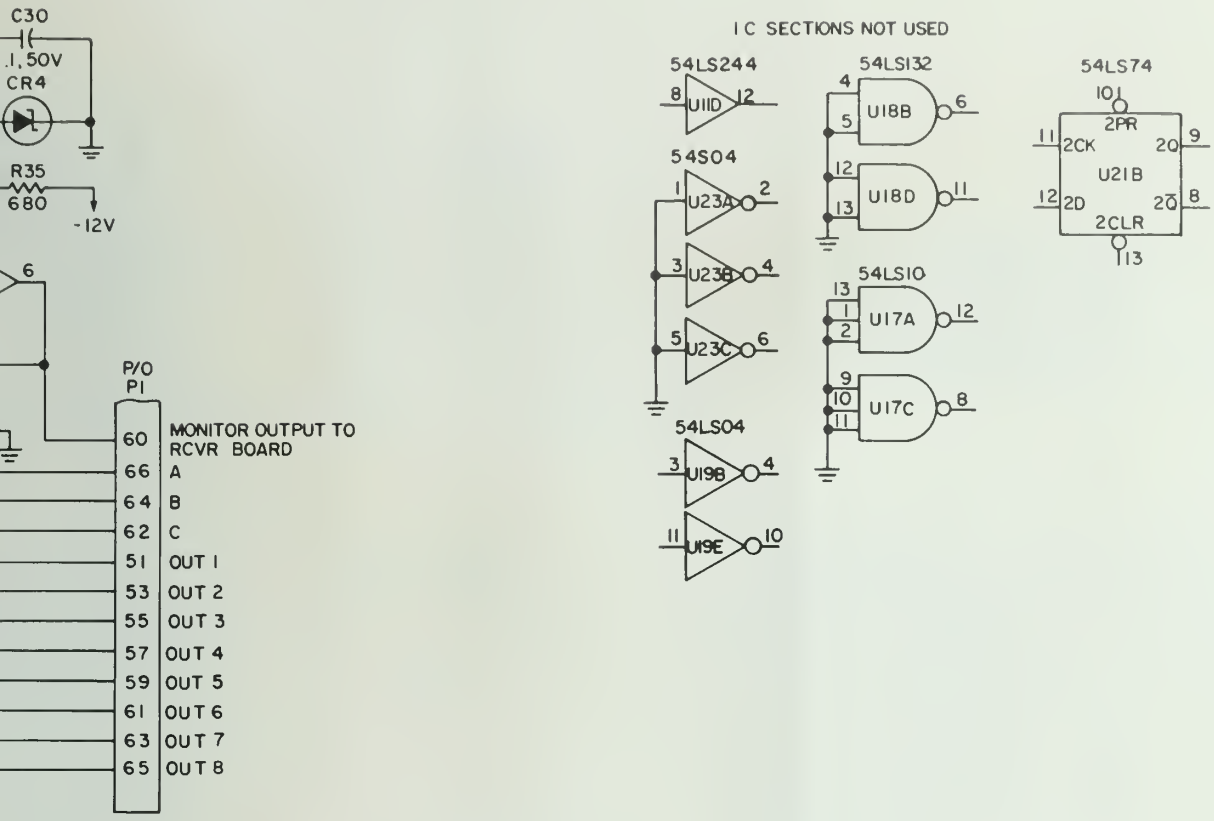
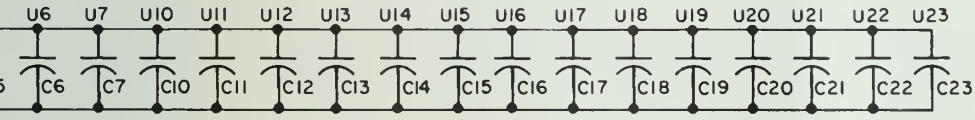
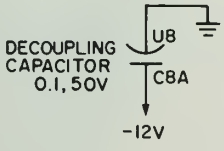
DESIGN		
APPROVED BY		
APPROVED BY		

SIZE D | DATE 12/17/84 | DRAWING NO. R450-A2A8-1
SCALE | SHEET 1 OF 2 | FILE







S OTHERWISE SPECIFIED: IONS ARE IN INCHES ANCES: ANGLES ± .5° CE DECIMALS ± .005 CE DECIMALS ± .02	ENGINEERING DIVISION SILVER SPRING, MD. 20910	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE
	PREPARED CHECKED DESIGN APPROVED BY APPROVED BY	DE TRANSMITTER CCA N1A2A8 SCHEMATIC DIAGRAM
		SIZE C · DATE 12/17/84 · DRAWING NO. R450-A2A8-2 SCALE · SHEET 2 OF 2 · FILE

SPECIFICATION OR MATERIAL

COMMERCE
ERIC ADMINISTRATION
SERVICE

A N1A2A9
IAGRAM

2 FILE

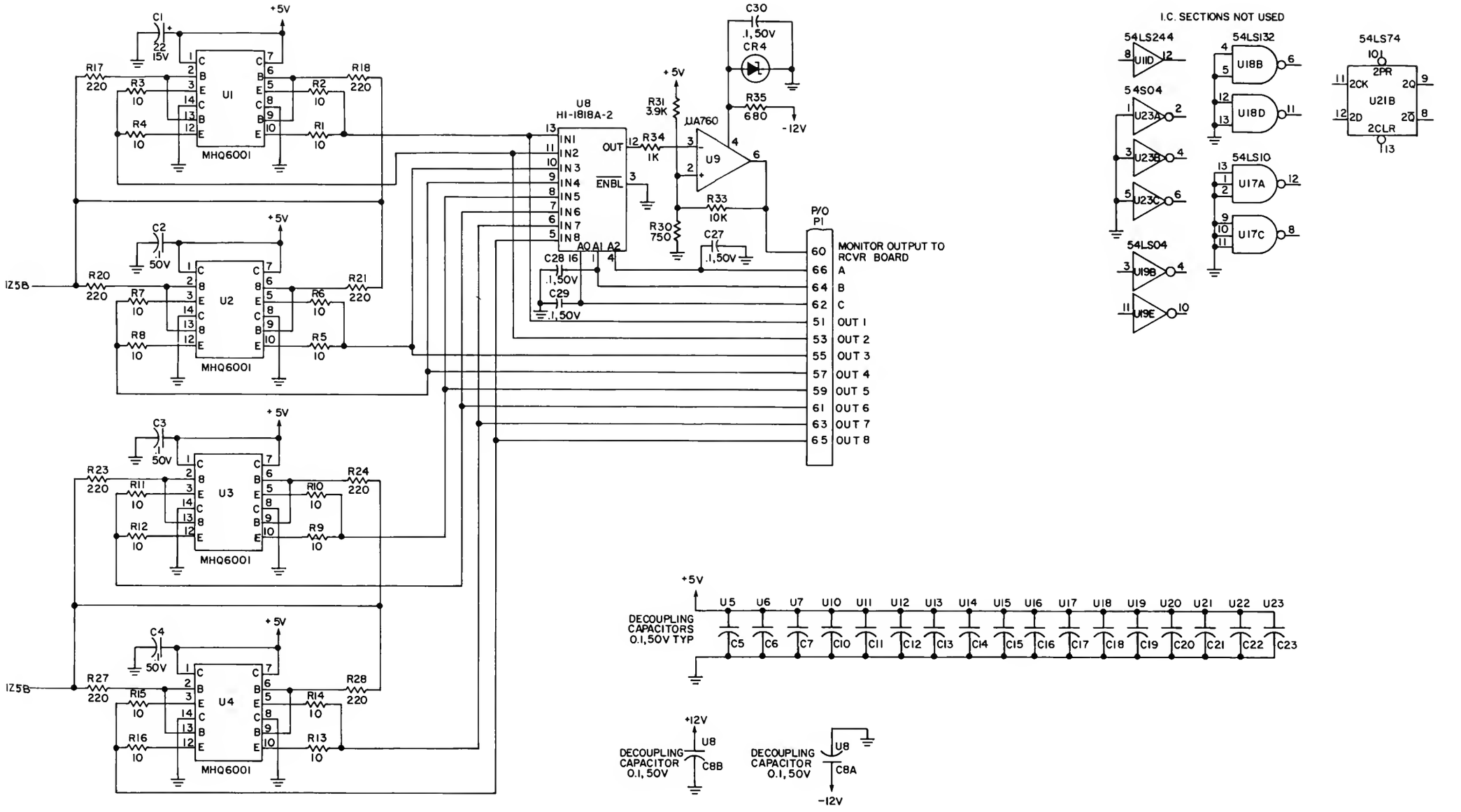
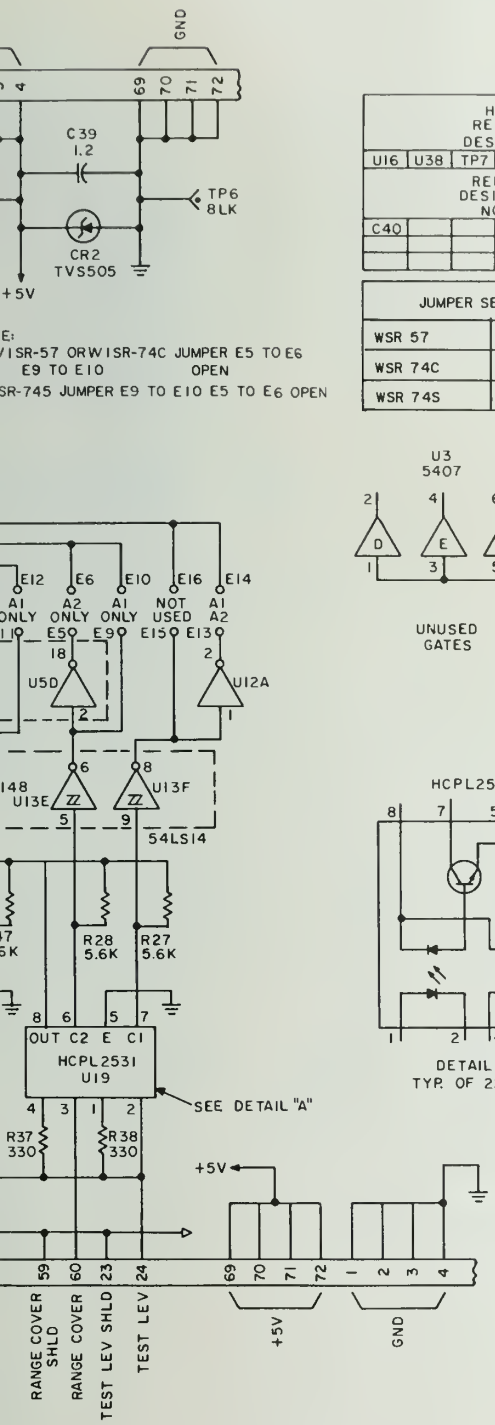


FIGURE 10-28

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: ANGLES ± .5° 3 PLACE DECIMALS ± .005 2 PLACE DECIMALS ± .02	ENGINEERING DIVISION SILVER SPRING, MD. 20910	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE
	PREPARED	DE TRANSMITTER CCA N1A2A8 SCHEMATIC DIAGRAM
	CHECKED	
	DESIGN	
	APPROVED BY	
	APPROVED BY	SIZE C · DATE 12/17/84 · DRAWING NO. R450-A2A8-2
		SCALE · SHEET 2 OF 2 · FILE



HIGHEST REFERENCE DESIGNATION						
U16	U38	TP7	R104	C40	Q1	CR2
REFERENCE DESIGNATIONS NOT USED						
C40						

JUMPER SEQUENCE				
WSR 57	A2	A3	A5	A8
WSR 74C	A1	A4	A5	A8
WSR 74S	A1	A4		A8

E:
/ISR-57 ORWISR-74C JUMPER E5 TO E6
E9 TO E10 OPEN
SR-745 JUMPER E9 TO E10 E5 TO E6 OPEN

NOTES: UNLESS OTHERWISE SPECIFIED:
1. PARTIAL REFERENCE DESIGNATION ARE SHOWN. FOR COMPLETE DESIGNATION PREFIX WITH N1A2A9 10.
2. RESISTANCE VALUES ARE IN OHMS.
3. RESISTORS ARE 1/4 WATT, 5% TOLERANCE.
4. CAPACITANCE VALUES ARE IN MICROFARADS.
5. NOTED COMPONENTS ARE USED ON A1 ASS'Y ONLY, AND ARE OMITTED FOR THE A2 ASS'Y.

A2 ASSY WSR-57	A1 ASSY WSR-74	DEVICE	PWR & GND CONNECTION +5V	GND	I-+5V	I-GND
U1	U1	HCPL-2531			SEE SCHEMATIC	
U2	U2	HCPL-2531				
U3	U3	5407				
U4	U4	54122			SEE SCHEMATIC	
U5	U5	54LS240	20	10		
—	U6	54LS373				
—	U7	54LS373				
—	U8	54LS244				
U8	—	54LS240				
—	U9	54LS373				
—	U10	54LS373	20	10		
—	U11	54LS14	14	7		
U12	U12					
U13	U13					
U14	U14					
—	U15					
—	U16					
—	U17	54LS14	14	7		
U18	U18	HCPL-2531				
U19	U19				SEE SCHEMATIC	
—	U20					
—	U21					
—	U22					
U23	U23					
U24	U24					
—	U25					
—	U26					
—	U27					
U28	U28					
—	U29					
—	U30					
—	U31					
—	U32					
U33	U33					
—	U34					
—	U35					
—	U36					
—	U37	HCPL-2531				
U38	U38	LM111			SEE SCHEMATIC	

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ± .5°
3 PLACE DECIMALS ± .005
2 PLACE DECIMALS ± .02

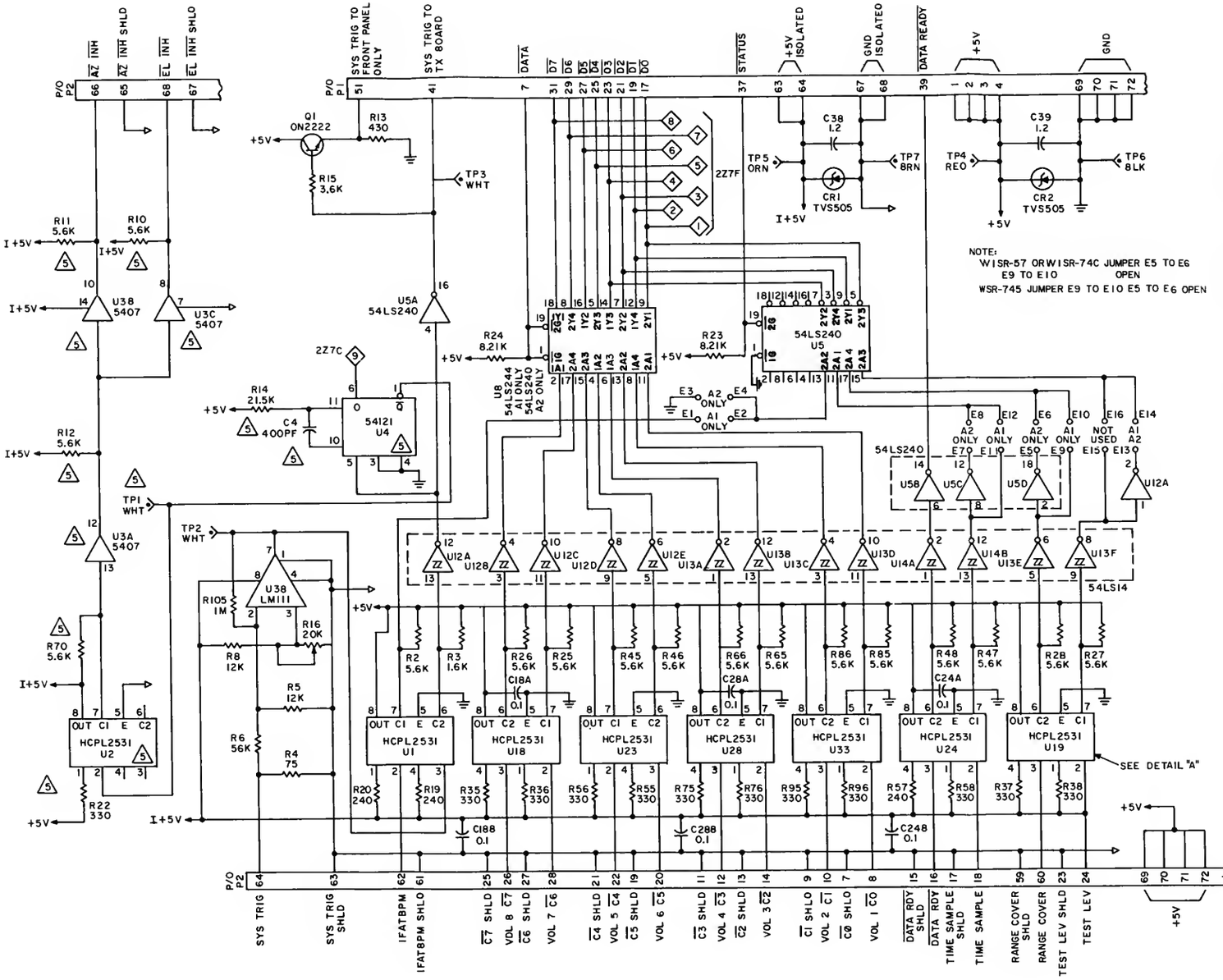
ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED	D Edelen	12/18/84
CHECKED		
DESIGN		
APPROVED BY		
APPROVED BY		

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

INPUT BUFFER CCA N1A2A9 SCHEMATIC DIAGRAM

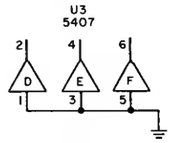
SIZE	DATE	DRAWING NO.
D	12/18/84	R450-A2A9-1
SCALE		SHEET 1 OF 2 FILE

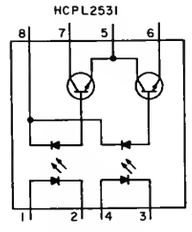


HIGHEST REFERENCE DESIGNATION						
U16	U38	TP7	R104	C40	Q1	CR2
REFERENCE DESIGNATIONS NOT USED						
C40						

JUMPER SEQUENCE				
WSR 57	A2	A3	A5	A8
WSR 74C	A1	A4	A5	A8
WSR 74S	A1	A4		A8

U3 5407





NOTES: UNLESS OTHERWISE SPECIFIED:
1. PARTIAL REFERENCE DESIGNATION ARE SHOWN. FOR COMPLETE DESIGNATION PREFIX WITH N1A2A9 10.
2. RESISTANCE VALUES ARE IN OHMS.
3. RESISTORS ARE 1/4 WATT, 5% TOLERANCE.
4. CAPACITANCE VALUES ARE IN MICROFARADS.
5. NOTED COMPONENTS ARE USED ON A1 ASS'Y. ONLY, AND ARE OMITTED FOR THE A2 ASS'Y.

A2 ASSY WSR-57	A1 ASSY WSR-74	DEVICE	PWR & GND CONNECTION +5V	GND	I-+5V	I-GND
U1	U1	HCPL-2531			SEE SCHEMATIC	
U2	U2	HCPL-2531			↕	
U3	U3	5407			↕	
U4	U4	54122			SEE SCHEMATIC	
U5	U5	54LS240	20	10		
—	U6	54LS373	↕	↕		
—	U7	54LS373				
—	U8	54LS244				
U8	—	54LS240				
—	U9	54LS373	↕	↕		
—	U10	54LS373	20	10		
—	U11	54LS14	14	7		
U12	U12		↕	↕		
U13	U13					
U14	U14					
—	U15					
—	U16		↕	↕		
—	U17	54LS14	14	7		
U18	U18	HCPL-2531				
U19	U19	↕			SEE SCHEMATIC	
—	U20				↕	
—	U21					
—	U22					
U23	U23					
U24	U24					
—	U25					
—	U26					
—	U27					
U28	U28					
—	U29					
—	U30					
—	U31					
—	U32					
U33	U33					
—	U34					
—	U35					
—	U36					
—	U37	HCPL-2531				
U38	U38	LM111			SEE SCHEMATIC	

FIGURE 10-29

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	OWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±.5°
3 PLACE DECIMALS ±.005
2 PLACE DECIMALS ±.02

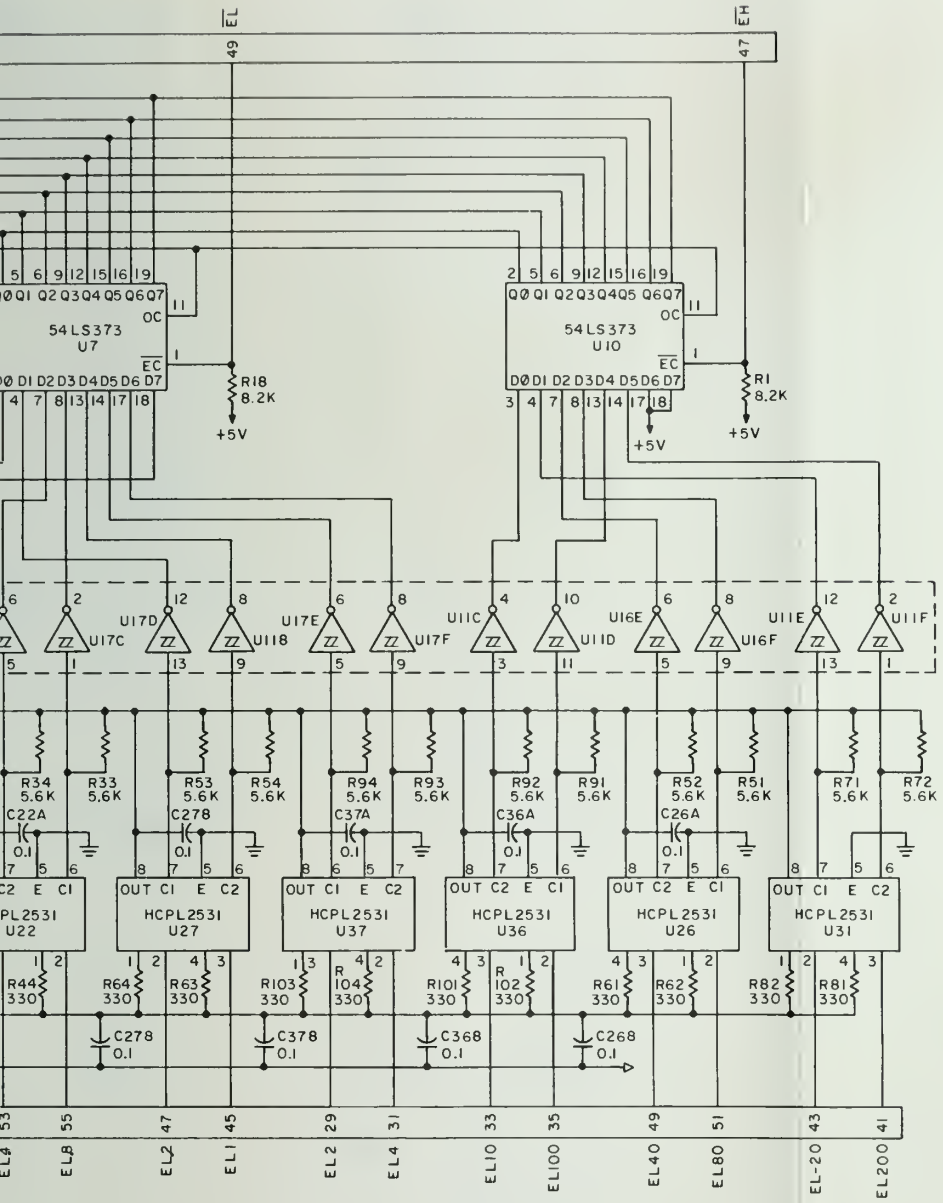
ENGINEERING DIVISION
SILVER SPRING, MD. 20910

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

PREPARED	D. Edelson	12/18/84
CHECKED		
DESIGN		
APPROVED BY		
APPROVED BY		

INPUT BUFFER CCA N1A2A9 SCHEMATIC DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/18/84	R450-A2A9-1
SCALE		SHEET 1 OF 2 — FILE



FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ± .5°
3 PLACE DECIMALS ± .005
2 PLACE DECIMALS ± .02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED	D Edelen	12/17/84
CHECKED		
DESIGN		
APPROVED BY		
APPROVED BY		

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

INPUT BUFFER CCA N1A2A9
SCHEMATIC DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/18/84	R450-A2A9-2
SCALE		SHEET 2 OF 2 FILE

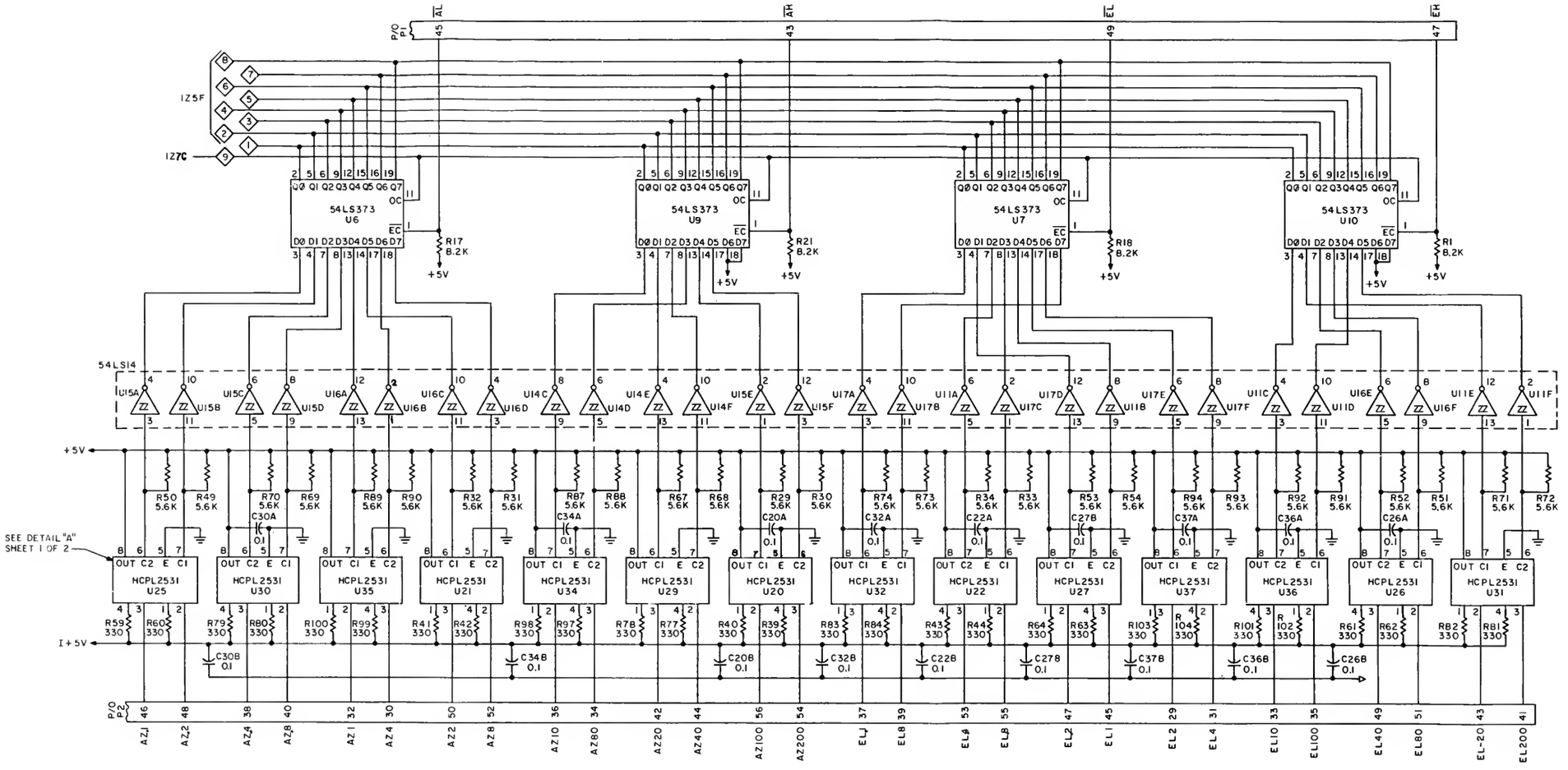


FIGURE 10-29

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±.5°
3 PLACE DECIMALS ±.005
2 PLACE DECIMALS ±.02

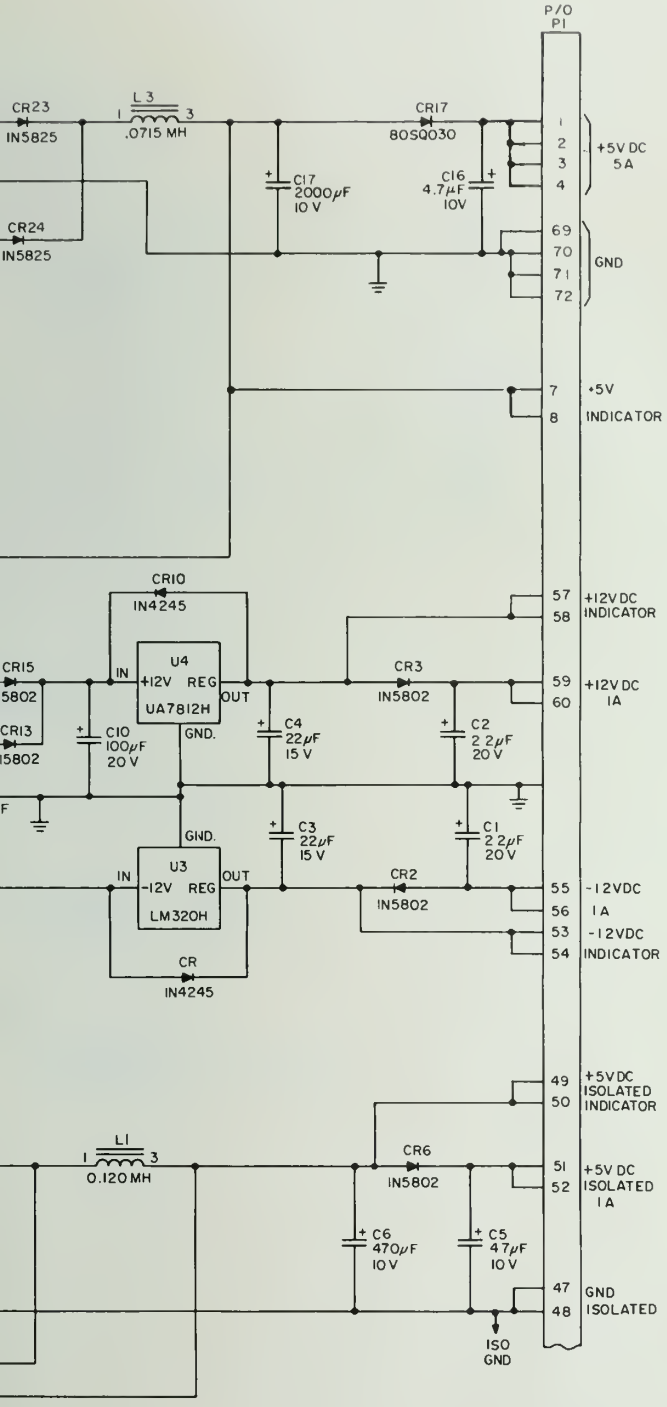
ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED	D Edelen	12/17/84
CHECKED	DP	
DESIGN		
APPROVED BY		
APPROVED BY		

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

INPUT BUFFER CCA N1A2A9
SCHEMATIC DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/18/84	R450-A2A9-2
SCALE		SHEET 2 OF 2
		FILE



FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ± .5°
3 PLACE DECIMALS ± .005
2 PLACE DECIMALS ± .02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED	D. EOELE	12/17/84
CHECKED		
DESIGN		
APPROVED BY		
APPROVED BY		

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

DE POWER SUPPLY ASSEMBLY AND POWER SUPPLY CCA N1A2A1/A2, SCHEMATIC DIAGRAM.

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A2A1/A2-1
SCALE		SHEET / FILE

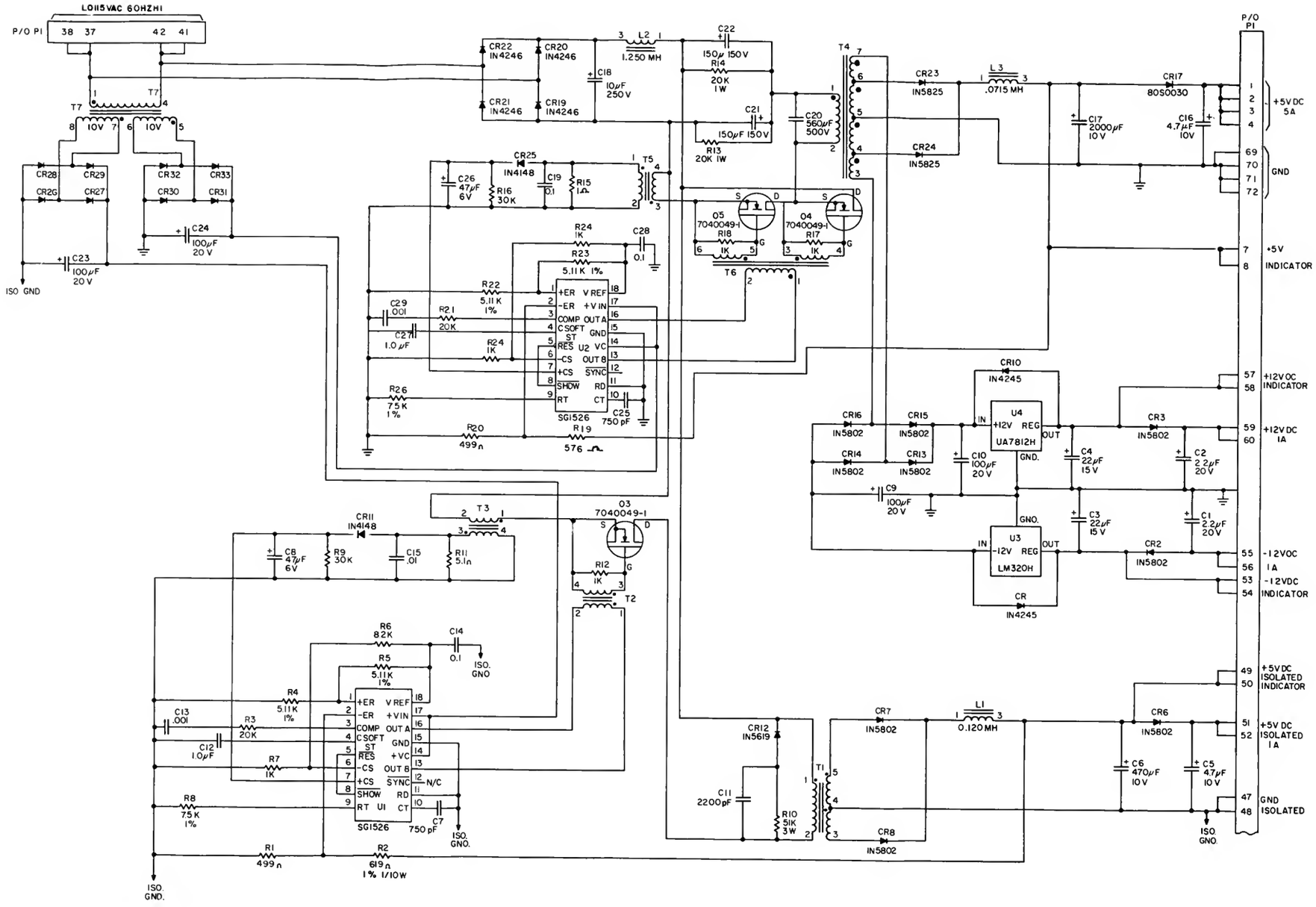


FIGURE 10-23

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL
LIST OF MATERIAL							

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±.5°
3 PLACE DECIMALS ±.005
2 PLACE DECIMALS ±.02

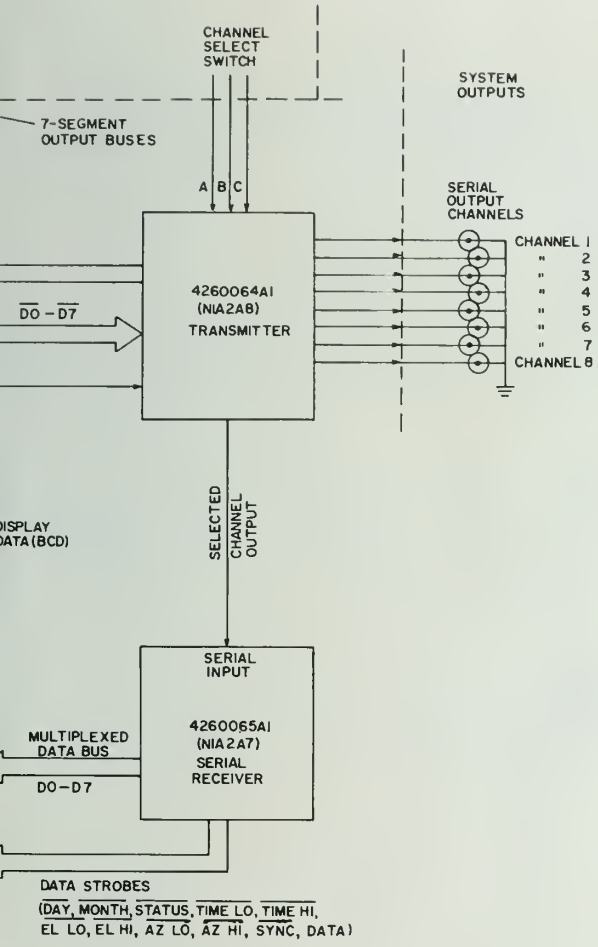
ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED	D. EDELEN	12/07/84
CHECKED		
DESIGN		
APPROVED BY		
APPROVED BY		

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

DE POWER SUPPLY ASSEMBLY AND POWER SUPPLY CCA N1A2A1/A2, SCHEMATIC DIAGRAM.

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A2A1/A2-1
SCALE	SHEET	FILE



FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	OWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ± .5°
3 PLACE DECIMALS ± .005
2 PLACE DECIMALS ± .02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED	N. Edden	
CHECKED		
DESIGN		

APPROVED BY

APPROVED BY

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

IDE SIGNAL FLOW DIARAM

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A-1

SCALE | SHEET | FILE

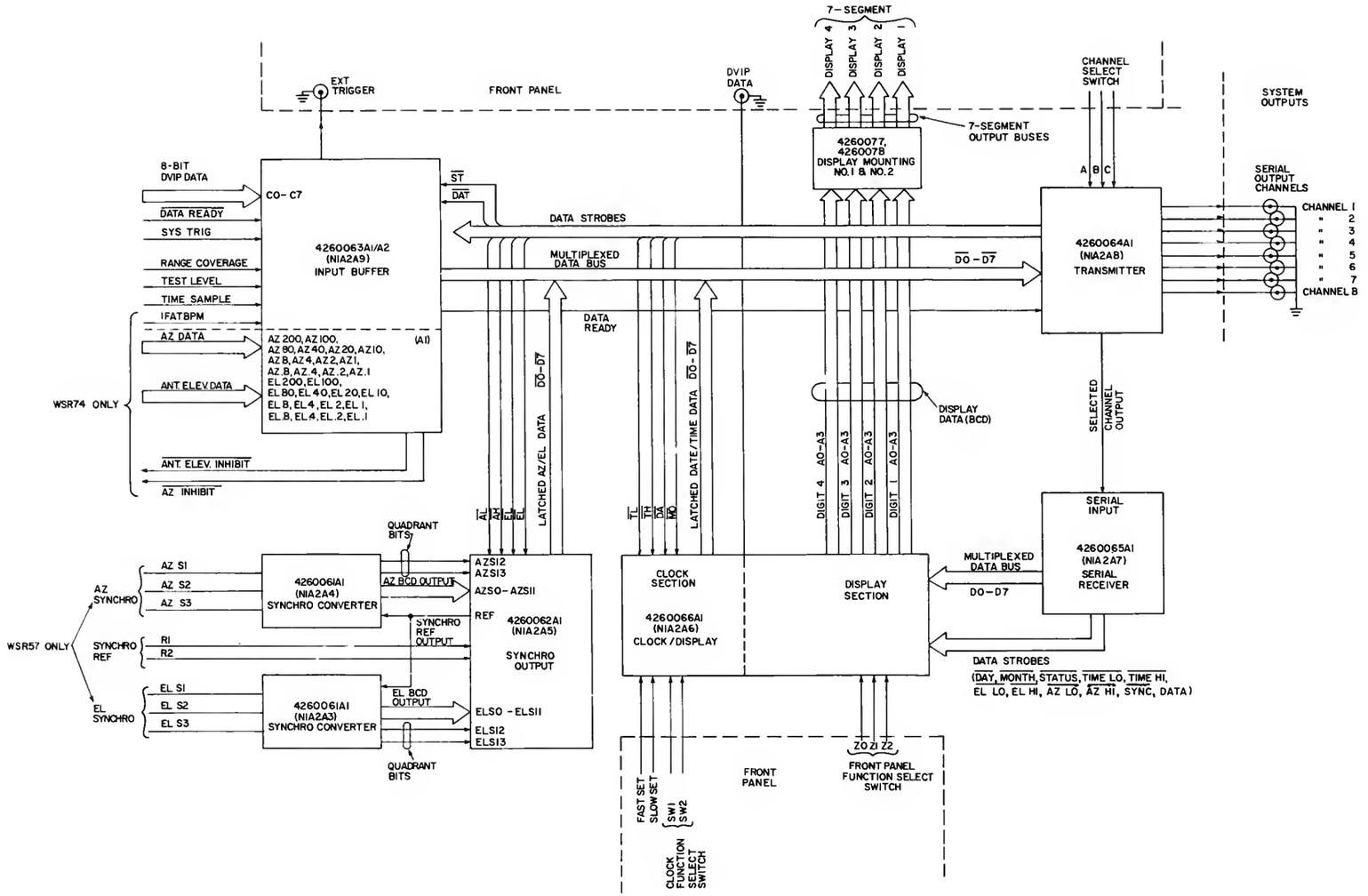


FIGURE 10-19

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±.5°
3 PLACE DECIMALS ±.005
2 PLACE DECIMALS ±.02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

PREPARED	N. Edlen
CHECKED	
DESIGN	
APPROVED BY	
APPROVED BY	

IDE SIGNAL FLOW DIARAM

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A-1
SCALE		SHEET / FILE

TABLE I

POWER AND GROUND CONNECTIONS					
+5V BUS	+5V ISOL	+12V BUS	-12V BUS	GND BUS	GND ISOL
2, 3, 4	51, 52	59, 60	55, 56	69, 70, 71, 72	47, 48
2, 3, 4	51, 52	59, 60	55, 56	69, 70, 71, 72	47, 48
		59, 60	55, 56	69, 70, 71, 72	
		59, 60	55, 56	69, 70, 71, 72	
,2		67, 68	65, 66	69, 70, 71, 72	
, 2, 3, 4		67, 68	65, 66	69, 70, 71, 72	
, 2, 3, 4		65, 66	61, 62	69, 70, 71, 72	
, 2, 3, 4		67, 68		69, 70, 71, 72	
, 2, 3, 4	63, 64			69, 70, 71, 72	67, 68
69, 70, 71, 72				1, 2, 3, 4	7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 59, 61, 63, 65, 67
, 2, 3, 4	63, 64	59, 60	55, 56	69, 70, 71, 72	67, 68
4, 30, 31, 39, 40	41	16		32	47, 48, 49, 50
					35, 41, 18 THRU 24
					2 THRU 8, 17, 18 20, 22, 32, 34, 36, 38, 45, 47, 48, 50
				E2, E4, E6, E8, E10, E12, E14, E16	

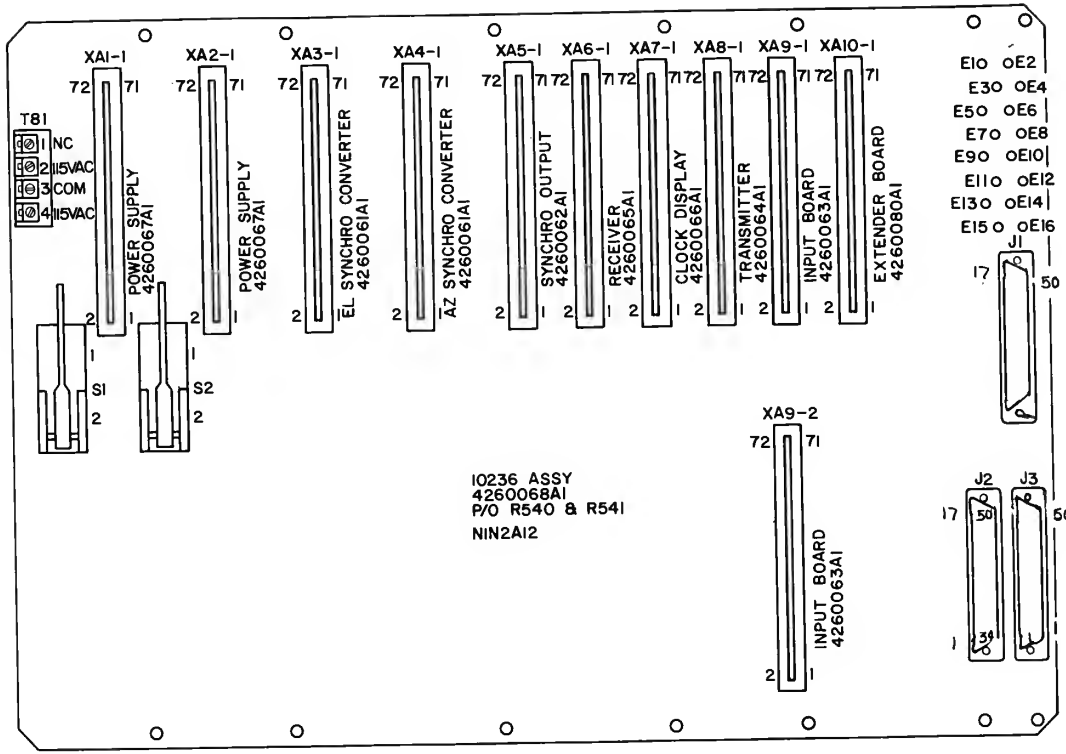
FIED: S 5"	ENGINEERING DIVISION SILVER SPRING, MD. 20910			U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE		
	PREPARED			BACKPLANE ASSEMBLY N1A2A12 INTERCONNECT DIAGRAM		
	CHECKED					
	DESIGN					
	APPROVED BY					
	APPROVED BY			SIZE C	DATE 12/17/84	DRAWING NO. R450-A2A12-1
				SCALE	SHEET 1 OF 5	FILE

O.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

S. DEPARTMENT OF COMMERCE
OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

BACKPLANE ASSEMBLY
N1A2A12
TERCONNECT DIAGRAM

'/84	DRAWING NO. R450-A2A12-2	
	SHEET 2 OF 5	FILE



COMPONENT SIDE

TABLE I

POWER AND GROUND CONNECTIONS						
CONN DESIG	+5V BUS	+5V ISOL	+12V BUS	-12V BUS	GND BUS	GND ISOL
XA1-1	1, 2, 3, 4	51, 52	59, 60	55, 56	69, 70, 71, 72	47, 48
XA2-1	1, 2, 3, 4	51, 52	59, 60	55, 56	69, 70, 71, 72	47, 48
XA3-1			59, 60	55, 56	69, 70, 71, 72	
XA4-1			59, 60	55, 56	69, 70, 71, 72	
XA5-1	1, 2		67, 68	65, 66	69, 70, 71, 72	
XA6-1	1, 2, 3, 4		67, 68	65, 66	69, 70, 71, 72	
XA7-1	1, 2, 3, 4		65, 66	61, 62	69, 70, 71, 72	
XA8-1	1, 2, 3, 4		67, 68		69, 70, 71, 72	
XA9-1	1, 2, 3, 4	63, 64			69, 70, 71, 72	67, 68
XA9-2	69, 70, 71, 72				1, 2, 3, 4	7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 59, 61, 63, 65, 67
XA10-1	1, 2, 3, 4	63, 64	59, 60	55, 56	69, 70, 71, 72	67, 68
J1	14, 30, 31, 39, 40	41	16		32	47, 48, 49, 50
J2						35, 41, 18 THRU 24
J3						2 THRU 8, 17, 18 20, 22, 32, 34, 36, 38, 45, 47, 48, 50
TERMINAL					E2, E4, E6, E8, E10, E12, E14, E16	

NOTES:
UNLESS OTHERWISE SPECIFIED:
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATION, PREFIX WITH NIN2A12.
2. FOR POWER AND GROUND CONNECTIONS, SEE TABLE I.

FIGURE 10-30

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: ANGLES ± .5° 3 PLACE DECIMALS ± .005 2 PLACE DECIMALS ± .02	ENGINEERING DIVISION SILVER SPRING, MD. 20910	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE
	PREPARED CHECKED DESIGN APPROVED BY APPROVED BY	BACKPLANE ASSEMBLY N1A2A12 INTERCONNECT DIAGRAM
		SIZE C | DATE 12/17/84 | DRAWING NO. R450-A2A12-1 SCALE | SHEET 1 OF 5 | FILE

XA3-1
(N1A2A3)

	72	71	GND	GND BUS
	70	69	GND	GND BUS
	68	67		
	66	65		
	64	63		
	62	61		
	60	59	+12V	+12V BUS
	58	57		
	56	55	-12V	-12V BUS
	54	53		
	52	51		
	50	49	EL S13	XA5-1-52
	48	47	EL S12	XA5-1-51
	46	45	EL S11	XA5-1-54
	44	43	EL S10	XA5-1-53
	42	41	EL S9	XA5-1-56
	40	39	EL S8	XA5-1-55
	38	37	EL S7	XA5-1-58
	36	35	EL S6	XA5-1-57
	34	33	EL S5	XA5-1-60
	32	31	EL S4	XA5-1-59
	30	29	EL S3	XA5-1-62
	28	27	EL S2	XA5-1-61
	26	25	EL S1	XA5-1-64
	24	23	EL S0	XA5-1-63
	22	21		
	20	19		
	18	17		
	16	15		
	14	13		
	12	11		
	10	9		
	8	7		
	6	5		
	4	3		
	2	1		

XA4-1
(N1A2A4)

GND BUS	GND	72	71	GND	GND BUS
GND BUS	GND	70	69	GND	GND BUS
		68	67		
		66	65		
		64	63		
		62	61		
+12V BUS	+12V	60	59	+12V	+12V BUS
		58	57		
-12V BUS	-12V	56	55	-12V	-12V BUS
		54	53		
		52	51		
		50	49	AZ S13	XA5-1-4
		48	47	AZ S12	XA5-1-3
		46	45	AZ S11	XA5-1-6
		44	43	AZ S10	XA5-1-5
		42	41	AZ S9	XA5-1-8
		40	39	AZ S8	XA5-1-7
		38	37	AZ S7	XA5-1-10
		36	35	AZ S6	XA5-1-9
		34	33	AZ S5	XA5-1-12
		32	31	AZ S4	XA5-1-11
		30	29	AZ S3	XA5-1-14
		28	27	AZ S2	XA5-1-13
		26	25	AZ S1	XA5-1-16
		24	23	AZ S0	XA5-1-15
		22	21		
		20	19		
		18	17		
		16	15		
		14	13		
		12	11		
		10	9		
XA3-1-8, XA5-1-34	REF	8	7		
J3-13	AZ S1	6	5		
J3-44	AZ S2	4	3		
J3-43	AZ S3	2	1		

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL
LIST OF MATERIAL							

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ± .5°
3 PLACE DECIMALS ± .005
2 PLACE DECIMALS ± .02

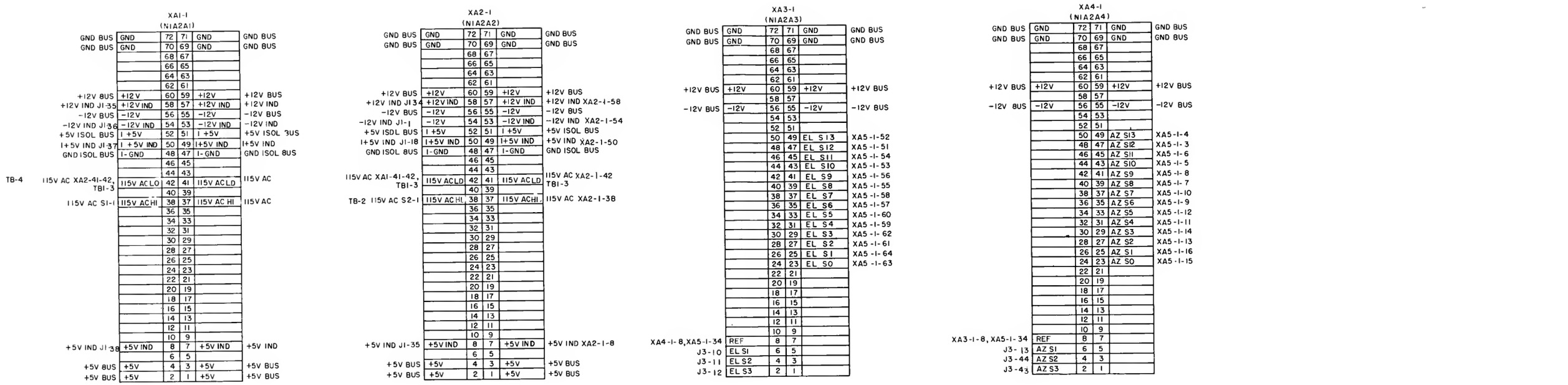
ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED	D. Edelen	12/17/84
CHECKED		
DESIGN		
APPROVED BY		
APPROVED BY		

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

BACKPLANE ASSEMBLY N1A2A12 INTERCONNECT DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/17/84	1450-A2A12-2
SCALE		SHEET 2 OF 5 FILE



GND BUS	GND	72	71	GND	GND BUS
GND BUS	GND	70	69	GND	GND BUS
		68	67		
		66	65		
		64	63		
		62	61		
+12V BUS	+12V	60	59	+12V	+12V BUS
+12V IND J1-35	+12V IND	58	57	+12V IND	+12V IND
-12V BUS	-12V	56	55	-12V	-12V BUS
-12V IND J1-36	-12V IND	54	53	-12V IND	-12V IND
+5V ISOL BUS	1 +5V	52	51	1 +5V	+5V ISOL BUS
1+5V IND J1-37	1 +5V IND	50	49	1+5V IND	1+5V IND
GND ISOL BUS	1-GND	48	47	1-GND	GND ISOL BUS
		46	45		
		44	43		
TB-4 115V AC XA2-41-42, TB1-3	115V AC LO	42	41	115V AC LD	115V AC
		40	39		
115V AC SI-1	115V AC HI	38	37	115V AC HI	115V AC
		36	35		
		34	33		
		32	31		
		30	29		
		28	27		
		26	25		
		24	23		
		22	21		
		20	19		
		18	17		
		16	15		
		14	13		
		12	11		
		10	9		
+5V IND J1-38	+5V IND	8	7	+5V IND	+5V IND
		6	5		
+5V BUS	+5V	4	3	+5V	+5V BUS
+5V BUS	+5V	2	1	+5V	+5V BUS

XA2-1 (N1A2A2)

GND BUS	GND	72	71	GND	GND BUS
GND BUS	GND	70	69	GND	GND BUS
		68	67		
		66	65		
		64	63		
		62	61		
+12V BUS	+12V	60	59	+12V	+12V BUS
+12V IND J1-34	+12V IND	58	57	+12V IND	+12V IND XA2-1-58
-12V BUS	-12V	56	55	-12V	-12V BUS
-12V IND J1-1	-12V	54	53	-12V IND	-12V IND XA2-1-54
+5V ISOL BUS	1 +5V	52	51	1 +5V	+5V ISOL BUS
1+5V IND J1-18	1+5V IND	50	49	1+5V IND	+5V IND XA2-1-50
GND ISOL BUS	1-GND	48	47	1-GND	GND ISOL BUS
		46	45		
		44	43		
115V AC XA1-41-42, TB1-3	115V AC LD	42	41	115V AC LD	115V AC XA2-1-42 TB1-3
		40	39		
TB-2 115V AC S2-1	115V AC HI	38	37	115V AC HI	115V AC XA2-1-38
		36	35		
		34	33		
		32	31		
		30	29		
		28	27		
		26	25		
		24	23		
		22	21		
		20	19		
		18	17		
		16	15		
		14	13		
		12	11		
		10	9		
+5V IND J1-35	+5V IND	8	7	+5V IND	+5V IND XA2-1-8
		6	5		
+5V BUS	+5V	4	3	+5V	+5V BUS
+5V BUS	+5V	2	1	+5V	+5V BUS

XA3-1 (N1A2A3)

GND BUS	GND	72	71	GND	GND BUS
GND BUS	GND	70	69	GND	GND BUS
		68	67		
		66	65		
		64	63		
		62	61		
+12V BUS	+12V	60	59	+12V	+12V BUS
		58	57		
-12V BUS	-12V	56	55	-12V	-12V BUS
		54	53		
		52	51		
		50	49	EL S13	XA5-1-52
		48	47	EL S12	XA5-1-51
		46	45	EL S11	XA5-1-54
		44	43	EL S10	XA5-1-53
		42	41	EL S9	XA5-1-56
		40	39	EL S8	XA5-1-55
		38	37	EL S7	XA5-1-58
		36	35	EL S6	XA5-1-57
		34	33	EL S5	XA5-1-60
		32	31	EL S4	XA5-1-59
		30	29	EL S3	XA5-1-62
		28	27	EL S2	XA5-1-61
		26	25	EL S1	XA5-1-64
		24	23	EL S0	XA5-1-63
		22	21		
		20	19		
		18	17		
		16	15		
		14	13		
		12	11		
		10	9		
XA4-1-8, XA5-1-34	REF	8	7		
J3-10	EL S1	6	5		
J3-11	EL S2	4	3		
J3-12	EL S3	2	1		

XA4-1 (N1A2A4)

GND BUS	GND	72	71	GND	GND BUS
GND BUS	GND	70	69	GND	GND BUS
		68	67		
		66	65		
		64	63		
		62	61		
+12V BUS	+12V	60	59	+12V	+12V BUS
		58	57		
-12V BUS	-12V	56	55	-12V	-12V BUS
		54	53		
		52	51		
		50	49	AZ S13	XA5-1-4
		48	47	AZ S12	XA5-1-3
		46	45	AZ S11	XA5-1-6
		44	43	AZ S10	XA5-1-5
		42	41	AZ S9	XA5-1-8
		40	39	AZ S8	XA5-1-7
		38	37	AZ S7	XA5-1-10
		36	35	AZ S6	XA5-1-9
		34	33	AZ S5	XA5-1-12
		32	31	AZ S4	XA5-1-11
		30	29	AZ S3	XA5-1-14
		28	27	AZ S2	XA5-1-13
		26	25	AZ S1	XA5-1-16
		24	23	AZ S0	XA5-1-15
		22	21		
		20	19		
		18	17		
		16	15		
		14	13		
		12	11		
		10	9		
XA3-1-8, XA5-1-34	REF	8	7		
J3-13	AZ S1	6	5		
J3-44	AZ S2	4	3		
J3-43	AZ S3	2	1		

FIGURE 10-30

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±.5°
3 PLACE DECIMALS ±.005
2 PLACE DECIMALS ±.02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED	D. Edeler	12/17/84
CHECKED		
DESIGN		
APPROVED BY		
APPROVED BY		

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

BACKPLANE ASSEMBLY N1A2A12 INTERCONNECT DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/17/84	1450-A2A12-2
SCALE		SHEET 2 OF 5 FILE

XA7-1 (NIA2A7)						XA8-1 (NIA2A8)				
	72	71	GND	GND BUS	GND BUS	GND	72	71	GND	GND BUS
	70	69	GND	GND BUS	GND BUS	GND	70	69	GND	GND BUS
	68	67	BATT	XA7-1-68	−12V BUS	−12V	68	67	+12V	+12V BUS
	66	65	+12V	+12V BUS	J1-46	A	66	65	OUT 8	E1
	64	63			J1-45	B	64	63	OUT 7	E3
	62	61	−12V	−12V BUS	J1-44	C	62	61	OUT 6	E5
	60	59	A3, DI	J1-13	XA6-1-63	MOT OUT	60	59	OUT 5	E7
	58	57	A2, DI	J1-29			58	57	OUT 4	E9
	56	55	A1, DI	J1-12			56	55	OUT 3	E11
	54	53	A0, DI	J1-28			54	53	OUT 2	E13
	52	51	$\overline{\text{SYNC}}$	XA6-1-51			52	51	OUT 1	E15
	50	49	$\overline{\text{EL LO}}$	XA6-1-49			50	49	$\overline{\text{EL}}$	XA5-1-49, XA9-1-49
	48	47	$\overline{\text{EL HI}}$	XA6-1-47			48	47	$\overline{\text{EH}}$	XA5-1-47, XA9-1-47
	46	45	$\overline{\text{AZ LO}}$	XA6-1-45			46	45	$\overline{\text{AL}}$	XA5-1-45, XA9-1-45
	44	43	$\overline{\text{AZ HI}}$	XA6-1-43			44	43	$\overline{\text{AH}}$	XA5-1-43, XA9-1-43
	42	41	DVIP DATA	J1-15			42	41	SYST. TRIG.	XA9-1-41
	40	39	Z2	J1-11			40	39	$\overline{\text{DATA READY}}$	XA9-1-39
	38	37	$\overline{\text{STATUS}}$	XA6-1-37			38	37	$\overline{\text{STATUS}}$	XA9-1-37
	36	35	Z1	J1-27			36	35		
	34	33	Z0	J1-10			34	33		
	32	31	$\overline{\text{D7}}$	XA5-1-31, XA8-1-31, XA9-1-31			32	31	$\overline{\text{D7}}$	XA5-1-31, XA7-1-31, XA9-1-31
	30	29	$\overline{\text{D6}}$	XA5-1-29, XA8-1-29, XA9-1-29			30	29	$\overline{\text{D6}}$	XA5-1-29, XA7-1-29, XA9-1-29
	28	27	$\overline{\text{D5}}$	XA5-1-27, XA8-1-27, XA9-1-27			28	27	$\overline{\text{D5}}$	XA5-1-27, XA7-1-27, XA9-1-27
	26	25	$\overline{\text{D4}}$	XA5-1-25, XA8-1-25, XA9-1-25			26	25	$\overline{\text{D4}}$	XA5-1-25, XA7-1-25, XA9-1-25
	24	23	$\overline{\text{D3}}$	XA5-1-23, XA8-1-23, XA9-1-23			24	23	$\overline{\text{D3}}$	XA5-1-23, XA7-1-23, XA9-1-23
	22	21	$\overline{\text{D2}}$	XA5-1-21, XA8-1-21, XA9-1-21			22	21	$\overline{\text{D2}}$	XA5-1-21, XA7-1-21, XA9-1-21
	20	19	$\overline{\text{D1}}$	XA5-1-19, XA8-1-19, XA9-1-19			20	19	$\overline{\text{D1}}$	XA5-1-19, XA7-1-19, XA9-1-19
	18	17	$\overline{\text{D0}}$	XA5-1-17, XA8-1-17, XA9-1-17			18	17	$\overline{\text{D0}}$	XA5-1-17, XA7-1-17, XA9-1-17
	16	15	$\overline{\text{TIME HI}}$	XA6-1-15			16	15	$\overline{\text{TH}}$	XA7-1-16
	14	13	$\overline{\text{TIME LO}}$	XA6-1-13			14	13	$\overline{\text{TL}}$	XA7-1-14
	12	11	$\overline{\text{MONTH}}$	XA6-1-11			12	11	$\overline{\text{MO}}$	XA7-1-12
	10	9	$\overline{\text{DAY}}$	XA6-1-9			10	9	$\overline{\text{DAY}}$	XA7-1-10
	8	7	$\overline{\text{DATA STB}}$	XA6-1-7			8	7	$\overline{\text{DATA}}$	XA9-1-7
ET	6	5	SLOW SET	J1-26			6	5		
	4	3	+5V	+5V BUS	+5V BUS	+5V	4	3	+5V	+5V BUS
	2	1	+5V	+5V BUS	+5V BUS	+5V	2	1	+5V	+5V BUS

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ± 5°
3 PLACE DECIMALS ± .005
2 PLACE DECIMALS ± .02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED	D. Edelen	12/17/84
CHECKED		
DESIGN		
APPROVED BY		
APPROVED BY		

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

BACKPLANE ASSEMBLY NIA2A12 INTERCONNECT DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A2A12-3
SCALE		SHEET 3 OF 5 FILE

XA5-1
(N1A2A5)

GND BUS	GND	72	71	GND	GND BUS
GND BUS	GND	70	69	GND	GND BUS
+12V BUS	+12V	68	67	+12V	+12V BUS
−12V BUS	−12V	66	65	−12V	−12V BUS
XA3-1-25	EL S1	64	63	EL S0	XA3-1-23
XA3-1-29	EL S3	62	61	EL S2	XA3-1-27
XA3-1-33	EL S5	60	59	EL S4	XA3-1-31
XA3-1-37	EL S7	58	57	EL S6	XA3-1-35
XA3-1-41	EL S9	56	55	EL SB	XA3-1-39
XA3-1-45	EL S11	54	53	EL S10	XA3-1-43
XA3-1-49	EL S13	52	51	EL S12	XA3-1-47
		50	49	$\overline{EL}$	XA8-1-49, XA9-1-49
		48	47	$\overline{EH}$	XA8-1-47, XA9-1-47
		46	45	$\overline{AL}$	XA8-1-45, XA9-1-45
		44	43	$\overline{AH}$	XA8-1-43, XA9-1-43
		42	41		
		40	39	STB	NC
		38	37		
		36	35	R1(115V AC)	J3 - 41
XA3-1-8, XA4-1-8	REF	34	33	R2(115V AC)	J3 - 42
		32	31	$\overline{D7}$	XA7-1-31, XA8-1-31, XA9-1-31
		30	29	$\overline{D6}$	XA7-1-29, XA8-1-29, XA9-1-29
		28	27	$\overline{D5}$	XA7-1-27, XA8-1-27, XA9-1-27
		26	25	$\overline{D4}$	XA7-1-25, XA8-1-25, XA9-1-25
		24	23	$\overline{D3}$	XA7-1-23, XA8-1-23, XA9-1-23
		22	21	$\overline{D2}$	XA7-1-21, XA8-1-21, XA9-1-21
		20	19	$\overline{D1}$	XA7-1-19, XA8-1-19, XA9-1-19
		18	17	$\overline{D0}$	XA7-1-17, XA8-1-17, XA9-1-17
XA4-1-25	AZ S1	16	15	AZ S0	XA4-1-23
XA4-1-19	AZ S3	14	13	AZ S2	XA4-1-27
XA4-1-33	AZ S5	12	11	AZ S4	XA4-1-31
XA4-1-37	AZ S7	10	9	AZ S6	XA4-1-35
XA4-1-41	AZ S9	8	7	AZ SB	XA4-1-39
XA4-1-45	AZ S11	6	5	AZ S10	XA4-1-43
XA4-1-49	AZ S13	4	3	AZ S12	XA4-1-47
+5V BUS	+5V	2	1	+5V	+5V BUS

XA6-1
(N1A2A6)

GND BUS	GND	72	71	GND	GNO BUS
GND BUS	GND	70	69	GND	GND BUS
+12V BUS	+12V	68	67	+12V	+12V BUS
−12V BUS	−12V	66	65	−12V	−12V BUS
		64	63	SERIAL IN	XA8-1-6D
		62	61	$\overline{AUX\ DATA}$	NC
		60	59	$\overline{ERROR}$	NC
		58	57		
		56	55		
		54	53		
		52	51	$\overline{SYNCH}$	XA7-1-51
		50	49	$\overline{EL\ LO}$	XA7-1-49
		48	47	$\overline{EL\ HI}$	XA7-1-47
		46	45	$\overline{AZ\ LO}$	XA7-1-45
		44	43	$\overline{AZ\ HI}$	XA7-1-43
		42	41		
		40	39		
		38	37	$\overline{STATUS}$	XA7-1-37
		36	35		
		34	33		
XA7-1-32	D7	32	31	$\overline{D7}$	XA6-1-32
XA7-1-30	D6	30	29	D6	XA6-1-29
XA7-1-28	D5	28	27	$\overline{D5}$	XA6-1-27
XA7-1-26	D4	26	25	D4	XA6-1-25
XA7-1-24	D3	24	23	$\overline{D3}$	XA6-1-23
XA7-1-22	D2	22	21	$\overline{D2}$	XA6-1-21
XA7-1-20	D1	20	19	$\overline{D1}$	XA6-1-19
XA7-1-18	D0	18	17	$\overline{D0}$	XA6-1-17
		16	15	$\overline{TIME\ HI}$	XA7-1-15
		14	13	$\overline{TIME\ LO}$	XA7-1-13
		12	11	$\overline{MONTH}$	XA7-1-11
		10	9	$\overline{DAY}$	XA7-1-9
		8	7	$\overline{DATA\ STB}$	XA7-1-7
		6	5		
+5V BUS	+5V	4	3	+5V	+5V BUS
+5V BUS	+5V	2	1	+5V	+5V BUS

XA7-1
(N1A2A7)

GND BUS	GND	72	71	GNO	GND BUS
GND BUS	GND	70	69	GNO	GND BUS
J1-33	BATT	68	67	BATT	XA7-1-68
+12V BUS	+12V	66	65	+12V	+12V BUS
		64	63		
−12V BUS	−12V	62	61	−12V	−12V BUS
		60	59	A3, D1	J1-13
J1-43	SW1	58	57	A2, D1	J1-29
J1-19	A3,D2	56	55	A1, O1	J1-12
J1-3	A2,D2	54	53	A0, D1	J1-28
J1-20	A1, D2	52	51	$\overline{SYNC}$	XA6-1-51
J1-4	A0,D2	50	49	$\overline{EL\ LO}$	XA6-1-49
J1-21	A3,D3	48	47	$\overline{EL\ HI}$	XA6-1-47
J1-5	A2,D3	46	45	$\overline{AZ\ LO}$	XA6-1-45
J1-22	A1, D3	44	43	$\overline{AZ\ HI}$	XA6-1-43
J1-6	A0,D3	42	41	DVIP DATA	J1-15
J1-23	A3,D4	40	39	Z2	J1-11
J1-7	A2,D4	38	37	$\overline{STATUS}$	XA6-1-37
J1-24	A1, D4	36	35	Z1	J1-27
J1-8	A0,D4	34	33	Z0	J1-10
XA6-1-31-32	D7	32	31	$\overline{D7}$	XA5-1-31, XA8-1-31, XA9-1-31
XA6-1-29-30	D6	30	29	$\overline{D6}$	XA5-1-29, XA8-1-29, XA9-1-29
XA6-1-27-28	D5	28	27	$\overline{D5}$	XA5-1-27, XA8-1-27, XA9-1-27
XA6-1-25-26	D4	26	25	$\overline{D4}$	XA5-1-25, XA8-1-25, XA9-1-25
XA6-1-23-24	D3	24	23	$\overline{D3}$	XA5-1-23, XA8-1-23, XA9-1-23
XA5-1-21-22	D2	22	21	$\overline{D2}$	XA5-1-21, XA8-1-21, XA9-1-21
XA6-1-19-20	D1	20	19	$\overline{D1}$	XA5-1-19, XA8-1-19, XA9-1-19
XA6-1-17-18	D0	18	17	$\overline{D0}$	XA5-1-17, XA8-1-17, XA9-1-17
XA8-1-15	TH	16	15	$\overline{TIME\ HI}$	XA6-1-15
XA8-1-13	TL	14	13	$\overline{TIME\ LO}$	XA6-1-13
XA8-1-11	MO	12	11	$\overline{MONTH}$	XA6-1-11
XA8-1-9	DAY	10	9	$\overline{DAY}$	XA6-1-9
J1-25	SW2	8	7	$\overline{DATA\ STB}$	XA6-1-7
J1-9	FAST SET	6	5	SLOW SET	J1-26
+5V BUS	+5V	4	3	+5V	+5V BUS
+5V BUS	+5V	2	1	+5V	+5V BUS

XA8-1
(N1A2A8)

GND BUS	GND	72	71	GND	GND BUS
GND BUS	GND	70	69	GNO	GND BUS
−12V BUS	−12V	68	67	+12V	+12V BUS
J1-46	A	66	65	OUT B	E1
J1-45	B	64	63	OUT 7	E3
J1-44	C	62	61	OUT 6	E5
XA6-1-63	MOT OUT	60	59	OUT 5	E7
		58	57	OUT 4	E9
		56	55	OUT 3	E11
		54	53	OUT 2	E13
		52	51	OUT 1	E15
		50	49	$\overline{EL}$	XA5-1-49, XA9-1-49
		48	47	$\overline{EH}$	XA5-1-47, XA9-1-47
		46	45	$\overline{AL}$	XA5-1-45, XA9-1-45
		44	43	$\overline{AH}$	XA5-1-43, XA9-1-43
		42	41	$\overline{SYST.\ TRIG}$	XA9-1-41
		40	39	$\overline{DATA\ READY}$	XA9-1-39
		38	37	$\overline{STATUS}$	XA9-1-37
		36	35		
		34	33		
		32	31	$\overline{D7}$	XA5-1-31, XA7-1-31, XA9-1-31
		30	29	$\overline{D6}$	XA5-1-29, XA7-1-29, XA9-1-29
		28	27	$\overline{D5}$	XA5-1-27, XA7-1-27, XA9-1-27
		26	25	$\overline{D4}$	XA5-1-25, XA7-1-25, XA9-1-25
		24	23	$\overline{D3}$	XA5-1-23, XA7-1-23, XA9-1-23
		22	21	$\overline{D2}$	XA5-1-21, XA7-1-21, XA9-1-21
		20	19	$\overline{D1}$	XA5-1-19, XA7-1-19, XA9-1-19
		18	17	$\overline{D0}$	XA5-1-17, XA7-1-17, XA9-1-17
		16	15	$\overline{TH}$	XA7-1-16
		14	13	$\overline{TL}$	XA7-1-14
		12	11	$\overline{MO}$	XA7-1-12
		10	9	$\overline{DAY}$	XA7-1-10
		8	7	$\overline{DATA}$	XA9-1-7
		6	5		
+5V BUS	+5V	4	3	+5V	+5V BUS
+5V BUS	+5V	2	1	+5V	+5V BUS

FIGURE 10-30

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±.5°
3 PLACE DECIMALS ±.005
2 PLACE DECIMALS ±.02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED	D. Edelson	12/17/84
CHECKED		
DESIGN		
APPROVED BY		
APPROVED BY		

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

BACKPLANE ASSEMBLY
N1A2A12
INTERCONNECT DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A2A12-3
SCALE		SHEET 3 OF 5 FILE

XA9-2
(N1A2A9)

BUS	+5V	72	71	+5V	+5V BUS
BUS	+5V	70	69	+5V	+5V BUS
3-46	EL INH	68	67	I-GND	GND ISOL BUS
3-49	AZ INH	66	65	I-GND	GND ISOL BUS
6-33	SYS TRIG	64	63	I-GND	GND ISOL BUS
8-16	I FAT BPM	62	61	I-GND	GND ISOL BUS
4-15	RANGE COV	60	59	I-GND	GND ISOL BUS
		58	57		
2-43	AZ 100	56	55	EL .8	J3-31
2-45	AZ 200	54	53	EL .4	J2-44
2-47	AZ 8	52	51	EL 80	J2-46
2-50	AZ 2	50	49	EL 40	J2-48
2-17	AZ .2	48	47	EL .2	J2-49
2-16	AZ .1	46	45	EL 1	J2-33
2-15	AZ 40	44	43	EL 20	J2-32
2-14	AZ 20	42	41	EL 200	J2-31
2-13	AZ .8	40	39	EL 8	J2-30
2-12	AZ .4	38	37	EL .1	J2-29
2-11	AZ 10	36	35	EL 100	J2-28
2-10	AZ 80	34	33	EL 10	J2-27
2-9	AZ 1	32	31	EL 4	J2-26
2-8	AZ 4	30	29	EL 2	J2-25, J3-9
7-40	C6	28	27	I-GND	GND ISOL BUS
6-39	C7	26	25	I-GND	GND ISOL BUS
5-38	TEST LEVEL	24	23	I-GND	GND ISOL BUS
4-37	C4	22	21	I-GND	GND ISOL BUS
3-36	C5	20	19	I-GND	GND ISOL BUS
40	TIME SAMPLE	18	17	I-GND	GND ISOL BUS
-1	DATA RDY	16	15	I-GND	GND ISOL BUS
2-34	C2	14	13	I-GND	GND ISOL BUS
-19	C3	12	11	I-GND	GND ISOL BUS
-21	C1	10	9	I GND	GND ISOL BUS
-23	C0	8	7	I-GND	GND ISOL BUS
		6	5		
BUS	GND	4	3	GND	GND BUS
BUS	GND	2	1	GND	GND BUS

XA10-1
(N1A2A10)

GND BUS	GND	72	71	GND	GND BUS
GND BUS	GND	70	69	GND	GND BUS
GND ISOL BUS	I-GND	68	67	I-GND	GND ISOL BUS
		66	65		
+5V ISOL BUS	I +5V	64	63	I +5V	+5V ISOL BUS
		62	61		
+12V BUS	+12V	60	59	+12V	+12V BUS
		58	57		
+12V BUS	-12V	56	55	-12V	-12V BUS
		54	53		
		52	51		
		50	49		
		48	47		
		46	45		
		44	43		
		42	41		
		40	39		
		38	37		
		36	35		
		34	33		
		32	31		
		30	29		
		28	27		
		26	25		
		24	23		
		22	21		
		20	19		
		18	17		
		16	15		
		14	13		
		12	11		
		10	9		
		8	7		
		6	5		
+5V BUS	+5V	4	3	+5V	+5V BUS
+5V BUS	+5V	2	1	+5V	+5V BUS

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ± .5°
3 PLACE DECIMALS ± .005
2 PLACE DECIMALS ± .02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED	D. Edelen	12/17/84
CHECKED	JP	
DESIGN		
APPROVED BY		
APPROVED BY		

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

BACKPLANE ASSEMBLY
N1A2A12
INTERCONNET DIAGRAM

SIZE	DATE	DRAWING NO.
C	12/17/84	R450-A2A12-1
SCALE		SHEET 4 OF 5 FILE

XA9-1
(N1A2A9)

GND BUS	GND	72	71	GND	GND BUS
GND BUS	GND	70	69	GND	GND BUS
GND ISOL BUS	I-GND	68	67	I-GND	GND ISOL BUS
		66	65		
+5V ISOL BUS	I +5V	64	63	I +5V	+5 ISOL BUS
		62	61		
		60	59		
		58	57		
		56	55		
		54	53		
		52	51	SYST TRIG	J1-17
		50	49	$\overline{E}$	XA5-1-49, XA8-1-49
		48	47	$\overline{EH}$	XA5-1-47, XA8-1-47
		46	45	$\overline{AL}$	XA5-1-45, XA8-1-45
		44	43	$\overline{AH}$	XA5-1-43, XA8-1-43
		42	41	SYS TRIG	XA8-1-41
		40	39	$\overline{\text{DATA READY}}$	XA8-1-39
		38	37	$\overline{\text{STATUS}}$	XA8-1-37
		36	35		
		34	33		
		32	31	$\overline{D7}$	XA5-1-31, XA7-1-31, XA8-1-31
		30	29	$\overline{D6}$	XA5-1-29, XA7-1-29, XA8-1-29
		28	27	$\overline{D5}$	XA5-1-27, XA7-1-27, XA8-1-27
		26	25	$\overline{D4}$	XA5-1-25, XA7-1-25, XA8-1-25
		24	23	$\overline{D3}$	XA5-1-23, XA7-1-23, XA8-1-23
		22	21	$\overline{D2}$	XA5-1-21, XA7-1-21, XA8-1-21
		20	19	$\overline{D1}$	XA5-1-19, XA7-1-19, XA8-1-19
		18	17	$\overline{D0}$	XA5-1-17, XA7-1-17, XA8-1-17
		16	15		
		14	13		
		12	11		
		10	9		
		8	7	$\overline{\text{DATA}}$	XA8-1-7
		6	5		
+5V BUS	+5V	4	3	+5V	+5V BUS
+5V BUS	+5V	2	1	+5V	+5V BUS

XA9-2
(N1A2A9)

+5V BUS	+5V	72	71	+5V	+5V BUS
+5V BUS	+5V	70	69	+5V	+5V BUS
J3-46	$\overline{\text{EL INH}}$	68	67	I-GND	GND ISOL BUS
J3-49	$\overline{\text{AZ INH}}$	66	65	I-GND	GND ISOL BUS
J3-26-33	SYS TRIG	64	63	I-GND	GND ISOL BUS
J3-16	I FAT BPM	62	61	I-GND	GND ISOL BUS
J3-14-15	RANGE COV	60	59	I-GND	GND ISOL BUS
		58	57		
J2-43	AZ 100	56	55	EL .8	J3-31
J2-45	AZ 200	54	53	EL .4	J2-44
J2-47	AZ 8	52	51	EL 80	J2-46
J2-50	AZ 2	50	49	EL 40	J2-48
J2-17	AZ .2	48	47	EL .2	J2-49
J2-16	AZ .1	46	45	EL 1	J2-33
J2-15	AZ 40	44	43	EL 20	J2-32
J2-14	AZ 20	42	41	EL 200	J2-31
J2-13	AZ .8	40	39	EL 8	J2-30
J2-12	AZ .4	38	37	EL .1	J2-29
J2-11	AZ 10	36	35	EL 100	J2-28
J2-10	AZ 80	34	33	EL 10	J2-27
J2-9	AZ 1	32	31	EL 4	J2-26
J2-8	AZ 4	30	29	EL 2	J2-25, J3-9
J2-7-40	C6	28	27	I-GND	GND ISOL BUS
J2-6-39	C7	26	25	I-GND	GND ISOL BUS
J2-5-38	TEST LEVEL	24	23	I-GND	GND ISOL BUS
J2-4-37	C4	22	21	I-GND	GND ISOL BUS
J2-3-36	C5	20	19	I-GND	GND ISOL BUS
J2-2, J-3-40	TIMESAMPLE	18	17	I-GND	GND ISOL BUS
J2-1, J3-1	$\overline{\text{DATA RDY}}$	16	15	I-GND	GND ISOL BUS
J2-42, J2-34	C2	14	13	I-GND	GND ISOL BUS
J3-35-19	C3	12	11	I-GND	GND ISOL BUS
J3-37-21	C1	10	9	I GND	GND ISOL BUS
J3-39-23	C0	8	7	I-GND	GND ISOL BUS
		6	5		
GND BUS	GND	4	3	GND	GND BUS
GND BUS	GND	2	1	GND	GND BUS

XA10-1
(N1A2A10)

GND BUS	GND	72	71	GND	GND BUS
GND BUS	GND	70	69	GND	GND BUS
GND ISOL BUS	I-GND	68	67	I-GND	GND ISOL BUS
		66	65		
+5V ISOL BUS	I +5V	64	63	I +5V	+5V ISOL BUS
		62	61		
+12V BUS	+12V	60	59	+12V	+12V BUS
		58	57		
+12V BUS	-12V	56	55	-12V	-12V BUS
		54	53		
		52	51		
		50	49		
		48	47		
		46	45		
		44	43		
		42	41		
		40	39		
		38	37		
		36	35		
		34	33		
		32	31		
		30	29		
		28	27		
		26	25		
		24	23		
		22	21		
		20	19		
		18	17		
		16	15		
		14	13		
		12	11		
		10	9		
		8	7		
		6	5		
+5V BUS	+5V	4	3	+5V	+5V BUS
+5V BUS	+5V	2	1	+5V	+5V BUS

FIGURE 10-30

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ± .5°
3 PLACE DECIMALS ± .005
2 PLACE DECIMALS ± .02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED	D. Edelen	12/17/84
CHECKED	DP	
DESIGN		
APPROVED BY		
APPROVED BY		

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

BACKPLANE ASSEMBLY
N1A2A12
INTERCONNET DIAGRAM

SIZE	DATE	DRAWING NO.
C	12/17/84	R450-A2A12-1
SCALE		SHEET 4 OF 5 FILE

J3

	GND ISOL BUS	I-GND	17	33	50	I-GND	GND ISOL BUS
7	XA9-2-62	I FAT BPM	16	32	49	AZ INH	XA9-2-66
9	XA9-2-60, J3-14	RANGE CONV	15	31	48	I-GND	GND ISOL BUS
2	XA9-2-60, J3-15	RANGE CONV	14	30	47	I-GND	GND ISOL BUS
1	XA4-1-6 J11-A	AZS1	13	29	46	EL INH	XA9-2-68
4	J11-F XA3-1-2	ELS2	12	28	45	I-GND	GND ISOL BUS
3	J11-E XA3-1-4	ELS3	11	27	44	AZS2	XA4-1-4, J11-B
56	XA3-1-6 J11-D	ELS1	10	26	43	AZS3	XA4-1-2, J11-C
4, J2-34	XA9-2-29, J2-25	EL 2	9	25	42	(115V AC) R2	XA5-1-33, J11-H
8US	GND ISOL BUS	I-GND	8	24	41	(115V AC) R1	XA5-1-35, J11-G
8, J2-7	GND ISOL BUS	I-GND	7	23	40	TIME SAMPLE	XA9-2-18, J2-2
6, J2-6	GND ISOL BUS	I-GND	6	22	39	CØ	XA9-2-8, J3-23
24, J2-5	GND ISOL BUS	I-GND	5	21	38	I-GND	GND ISOL BUS
22, J2-4	GND ISOL BUS	I-GND	4	20	37	C1	XA9-2-10, J3-21
20, J2-3	GND ISOL BUS	I-GND	3	19	36	I-GND	GND ISOL BUS
BUS	GND ISOL BUS	I-GND	2	18	35	C3	XA9-2-12, J3-19
4, J2-9	XA9-2-16, J2-1	DATA RDY	1		34	I-GND	GND ISOL BUS

SEE DETAIL C

33	SYST TRIG	XA9-2-64, J3-26
32	I-GND	GND ISOL BUS
31	EL .8	XA9-2-55
30	NC	
29	NC	
28	NC	
27	NC	
26	SYS TRIG	XA9-2-64, J3-33
25	NC	
24	NC	
23	CØ	XA9-2-8, J3-39
22	I-GND	GND ISOL BUS
21	C1	XA9-2-10, J3-37
20	I-GND	GND ISOL BUS
19	C3	XA9-2-12, J3-35
18	I-GND	GND ISOL BUS

DETAIL C

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL
LIST OF MATERIAL							

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±.5°
3 PLACE DECIMALS ±.005
2 PLACE DECIMALS ±.02

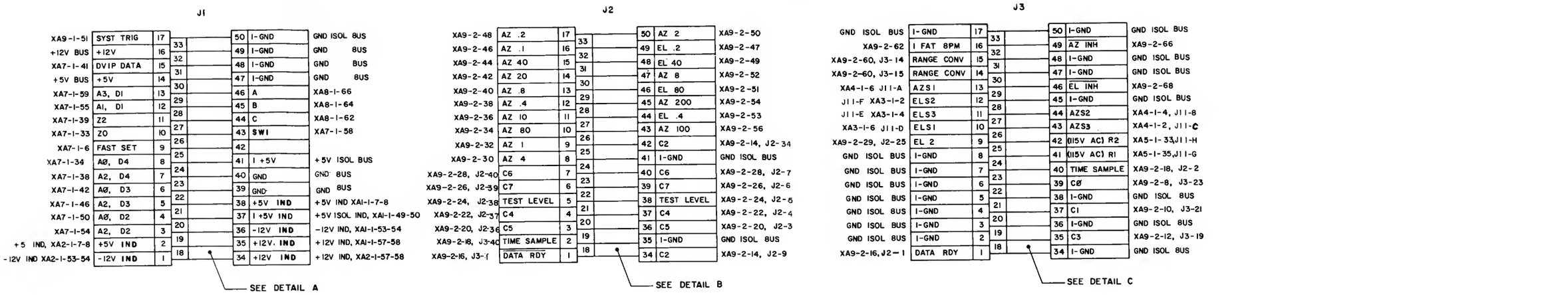
ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED	D. Edelen	12/17/84
CHECKED		
DESIGN		
APPROVED BY		
APPROVED BY		

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

BACKPLANE ASSEMBLY N1A2A12 INTERCONNECT DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A2A12-5
SCALE		SHEET 5 OF 5 FILE



33	BATT	XA -1-67-68
32	GND	GND BUS
31	+5V	+5V BUS
30	+5V	+5V BUS
29	A2, DI	XA7-1-57
28	A0, DI	XA7-1-53
27	Z1	XA7-1-35
26	SLOW SET	XA7-1-5
25	SW2	XA7-1-8
24	A1, D4	XA7-1-36
23	A3, D4	XA7-1-40
22	A1, D3	XA7-1-44
21	A3, D3	XA7-1-48
20	A1, D2	XA7-1-52
19	A3, D2	XA7-1-56
18	I+5 IND	+5V ISOL IND XA2-1-49-50

DETAIL A

33	EL 1	XA9-2-45
32	EL 20	XA9-2-43
31	EL 200	XA9-2-41
30	EL 8	XA9-2-39
29	EL .1	XA9-2-37
28	EL 100	XA9-2-35
27	EL 10	XA9-2-33
26	EL 4	XA9-2-31
25	EL 2	XA9-2-29, J3-9
24	I-GND	GND ISOL BUS
23	I-GND	GND ISOL BUS
22	I-GND	GND ISOL BUS
21	I-GND	GND ISOL BUS
20	I-GND	GND ISOL BUS
19	I-GND	GND ISOL BUS
18	I-GND	GND ISOL BUS

DETAIL B

33	SYST TRIG	XA9-2-64, J3-26
32	I-GND	GND ISOL BUS
31	EL .8	XA9-2-55
30	NC	
29	NC	
28	NC	
27	NC	
26	SYS TRIG	XA9-2-64, J3-33
25	NC	
24	NC	
23	C0	XA9-2-8, J3-39
22	I-GND	GND ISOL BUS
21	C1	XA9-2-10, J3-37
20	I-GND	GND ISOL BUS
19	C3	XA9-2-12, J3-35
18	I-GND	GND ISOL BUS

DETAIL C

FIGURE 10-30

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING NO.	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±.5°
3 PLACE DECIMALS ±.005
2 PLACE DECIMALS ±.02

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

PREPARED	D. Sadler	12/17/84
CHECKED		
DESIGN		
APPRVED BY		
APPRVED BY		

BACKPLANE ASSEMBLY N1A2A12 INTERCONNECT DIAGRAM

SIZE	DATE	DRAWING NO.
D	12/17/84	R450-A2A12-5
SCALE		SHEET 5 OF 5 FILE